OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

AMERICAN

DYESTUFF REPORTER

DEVOTED TO TEXTILE CHEMISTRY • BLEACHING • DYEING • PRINTING • FINISHING

OCTOBER 16, 1950
VOLUME 39, No. 21

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What's in a name...

is an old question for which experience has taught each of us the only answer.

A name like *Solophenyl* carries the assurance of outstanding quality—assurance that there are no faster-to-light Direct colors for Cotton, Rayon and mixed fabrics.

You are buying the "tops" in Direct colors when you buy Geigy *Solophenyl** colors.

* *Registered U. S. Patent Office*

Geigy

Dybstuff Makers Since 1859

GEIGY COMPANY, Inc.

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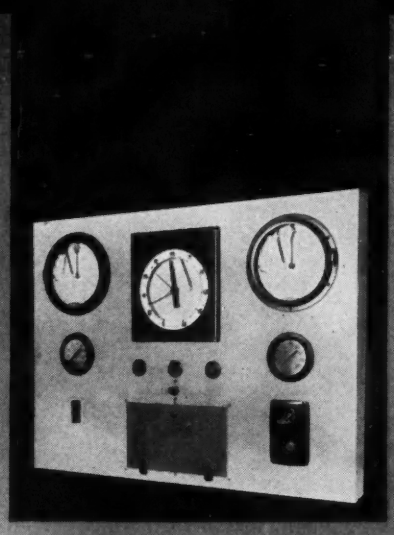
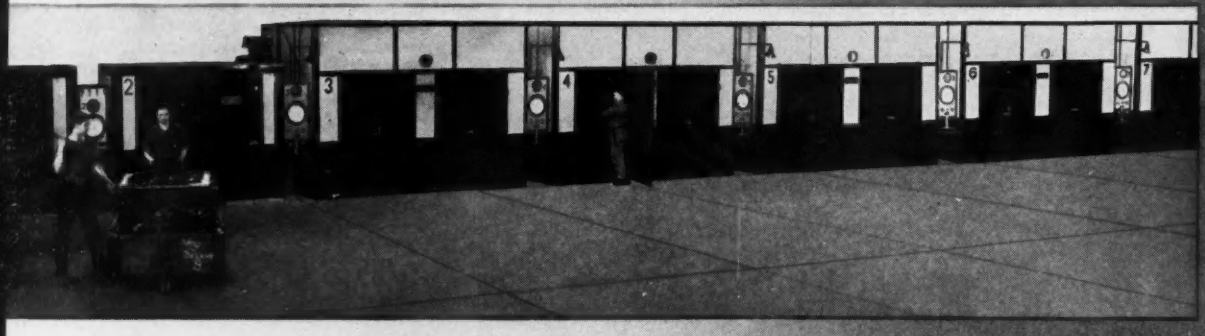
IN GREAT BRITAIN: The Geigy Co., Ltd., National Buildings, Parsonage, Manchester



modern steam dryers

-- instrument controlled --

to give you a SUPERIOR PRODUCT



Here at Althouse, a long row of modern Steam Dryers and Electronic Recording Thermometers, partially illustrated above, guarantee accuracy and uniformity in the manufacturing process. Our advanced methods prevent the dyestuffs from "breaking down", so that shade and dyeing properties are more uniform. By keeping impurities out, Althouse superior dyestuffs enable YOU to produce a superior product!

ALTHOUSE

Chemical Company, Inc.

READING, PENNSYLVANIA

pace-setter in precision dye-making

Traditionally

THE FINEST...

NEOLANS

BY CIBA

The time-tested choice
for all quality wool fabrics,
Neolan Colors are
distinguished by their

GOOD FASTNESS
LEVEL DYEING
SIMPLE APPLICATION
EASY SHADING

Illustration Courtesy of
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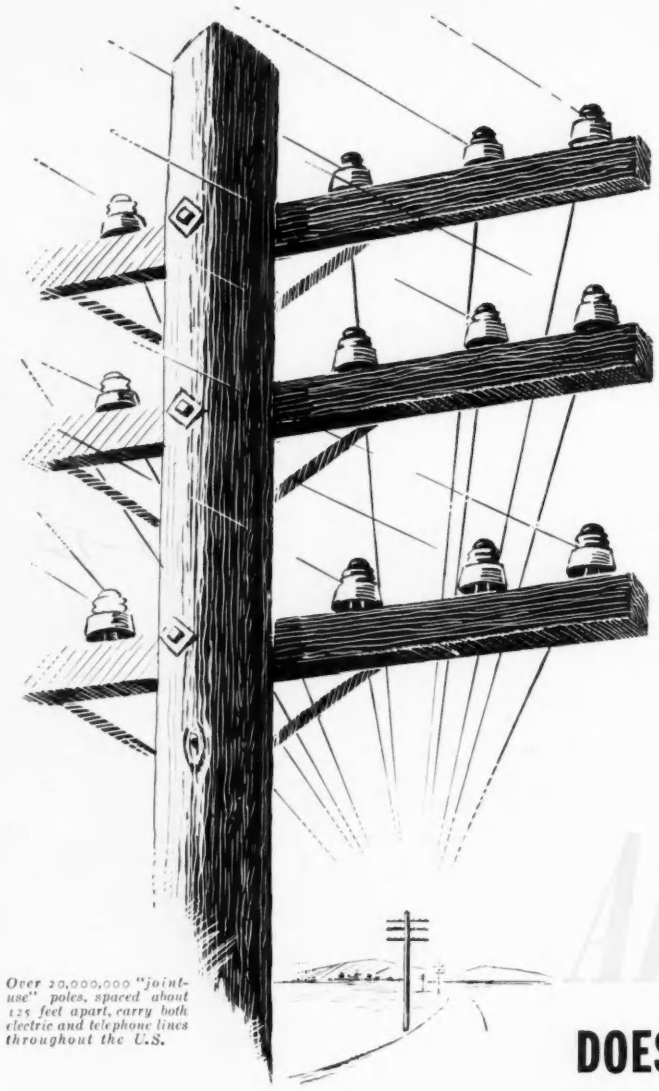

Over 20,000,000 "joint-use" poles, spaced about 125 feet apart, carry both electric and telephone lines throughout the U.S.

Amprozyme

DOES TWO JOBS AT ONE TIME

New De-Sizing Powder Converts Both Starches and Proteins in One Operation

Amprozyme does two jobs better, faster and cheaper. It eliminates the guess work from de-sizing by digesting either starches or proteins, or both, at the same time and in the same operation. If the size is starch, Amprozyme's amylolytic enzymes go right to work. If a protein size is present, its proteolytic enzymes start attacking. Amprozyme insures rapid and complete de-sizing of cottons, rayons, and mixed goods, resulting in a good hand and uniform ground for perfect dyeing, without streaks or shading. Amprozyme eliminates the necessity for two different agents or two separate operations thus reducing storage, handling and shipping costs. It can be utilized at normal or elevated dyebox temperatures, in a wide pH range. Amprozyme also remains stable longer. Detailed information and a sample for a test run are available upon request.

Plants: Passaic, N. J.
Carlstadt, N. J.
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WOLF BRAND CHEMICAL SPECIALTIES

JACQUES WOLF & CO.
Chemicals PASSAIC, N. J.

American Dyestuff Reporter, Vol. 39, No. 21, October 16, 1950. Published every other Monday. Copyright 1950, by Howes Publishing Co., Inc., 44 E. 23rd St., New York 10, N. Y. Domestic subscriptions, $5.00; Canadian, $6.00; Foreign, $10.00. Entered as second-class matter, Nov. 6, 1919, at the New York, N. Y. Post Office, under the act of March 3, 1879.

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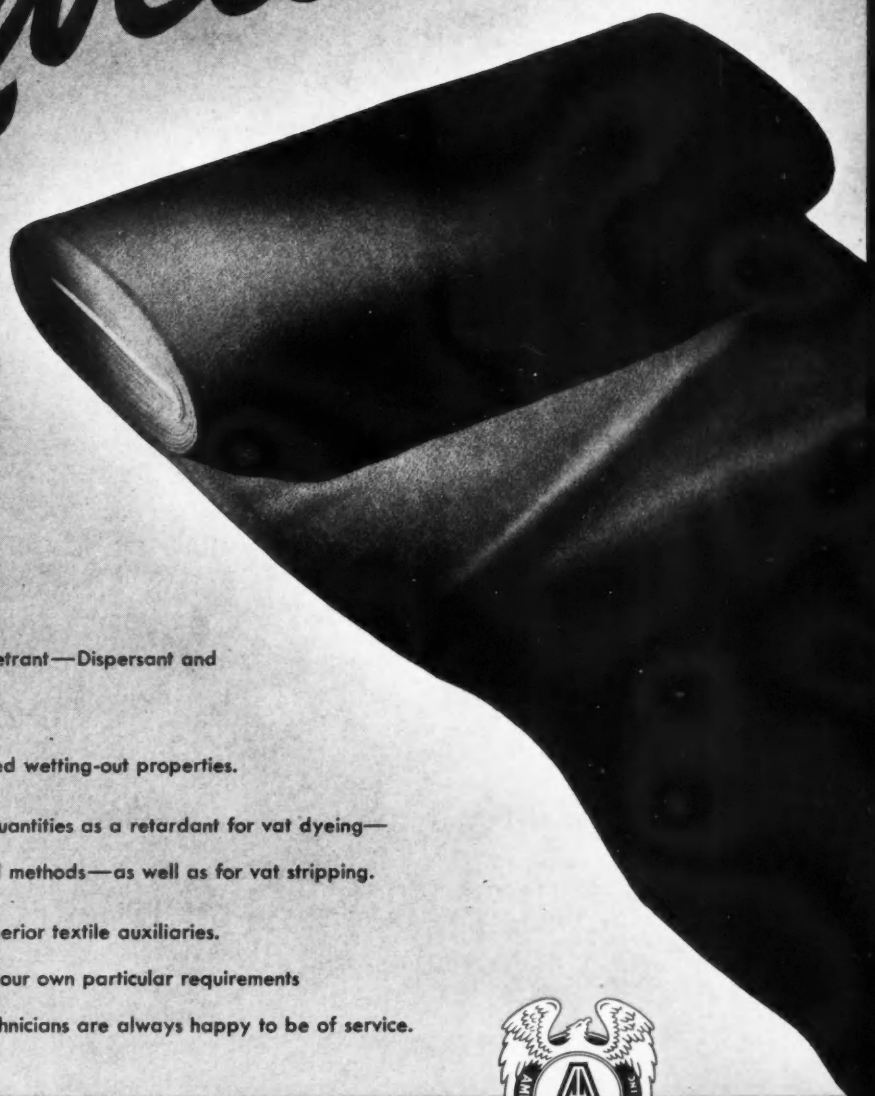
Product of
Wide Application

NEWLY IMPROVED!!!
now a *four star* product

Levelene*



★ wetting-out
★ preparing
★ dyeing
★ finishing

An effective Leveling agent—Penetrant—Dispersant and active Stripping Catalyzer.

New Levelene has greatly improved wetting-out properties.

Particularly well suited in minute quantities as a retardant for vat dyeing—either in the pigment pad or reduced methods—as well as for vat stripping.

Another of the A.A.P. range of superior textile auxiliaries.

For detailed information regarding your own particular requirements consult our nearest branch. A.A.P. technicians are always happy to be of service.

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*Reg. U. S. Pat. Off.

COTTON

SYNTHETIC FIBERS

WOOL

Step up scouring efficiency with synergistic action of SANTOMERSE No. 1 and Monsanto Tetra Sodium Pyrophosphate

Santomerse No. 1 and Monsanto Tetra Sodium Pyrophosphate are a team that gives the Textile Industry a bonus in detergency through synergistic action. Working together, the two chemicals deliver detergency higher than the average of the two used separately . . . higher than the detergency of either.

Because of their synergistic action, Santomerse No. 1 and Monsanto TSPP are widely used in textile operations such as scouring after dyeing, kier boiling of raw stock and piece goods, scouring and removal of enzymes, scouring of cotton and synthetic-fiber hosiery, scouring after continuous dyeing, in most scouring after printing and in some wool scouring.

Santomerse No. 1, used alone many places in textile mills, is economical because of its low price and because such small amounts are required. Using Monsanto TSPP with Santomerse No. 1 reduces costs still further.

Why not investigate Santomerse No. 1 and Monsanto TSPP with an eye to making your operations more efficient? For information on these or other Monsanto detergents, penetrants and wetting agents, contact the nearest Monsanto Sales Office or write MONSANTO CHEMICAL COMPANY, Phosphate Division, 1779-K South Second Street, St. Louis 4, Missouri.

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

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Anionic	Nonionic
Santomerse*No. 1	Sterox* SE
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Santomerse 30X	Sterox No. 5
Santomerse No. 3	Sterox No. 6
Santomerse No. 3 Paste	Sterox CD (Non-foaming detergent)
Santomerse D	

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FOR DE-SIZING

RAPIDASE®

Heat-stabilized amylolytic enzyme preparation, liquid. Solubilizes starch sizing in cotton, rayons and mixed goods . . . at extremely high temperatures. *De-size faster at lower cost with Rapidase.*

RAPIDASE-M **Intermediate strength—with all the characteristics, quality and value of Rapidase. For those who prefer a de-sizing agent of higher concentration.**

RAPIDASE-CONCENTRATED **For those whose needs demand a de-sizing preparation of highest unit strength. Because of its high concentration, greater economy is obtained in freight handling and storage expense.**

ZYMEX®

A powdered amylolytic enzyme preparation in high concentration. For those who prefer the convenience of a powdered enzyme . . . with all the advantages and economy of Rapidase.

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Proteolytic type liquid de-sizing agent. For de-sizing fabrics containing gelatin, casein, soya and other protein and albuminous sizes. Produces a finer, softer hand, more uniform quality, clearer cross dyes.

In conjunction with any enzyme preparation . . . SACON . . . a non-ionic wetting agent and detergent. It is compatible with enzymes and is applicable in neutral, acid or alkaline solutions.

Our technicians are available to visit your plant on request . . . Write for booklet.

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Gas Fading Protection on ANY Basis You Require!

Onyx Offers You . . .

a complete range of gas fading protection, from one-cycle to three-cycle periods. You can choose the treatment that meets your particular needs.

Durable One-Cycle Treatment

Onyx Neufume DMX, added to the dye liquor in the jig or dye beck, provides protection on a one-cycle basis with a high order of resistance to both washing and dry cleaning. No further finishing is required to obtain this result.

Non-Durable Two-Cycle Treatment

Onyx Neufume NS, used in the pad or quetsch, gives a high degree of protection against gas fading, on a two-cycle basis. The treatment is non-durable.

The Full Three-Cycle Treatment

Neufume DMX is added to the dye bath, and goods are dyed, rinsed and dried. They are then finished in the pad or quetsch with Neufume NS. Goods so treated show thorough protection against fading on a three-cycle exposure basis. The treatment provides satisfactory protection against washing and dry cleaning.

A Test Run Will Convince You

Let us arrange for a test run on any of your acetate constructions to meet your requirements in gas fading protection. We'll be glad to supply material for tests on all three treatments, if you wish.

onyx CHEMICALS FOR DYEING • FINISHING • PRINTING

ONYX OIL & CHEMICAL COMPANY
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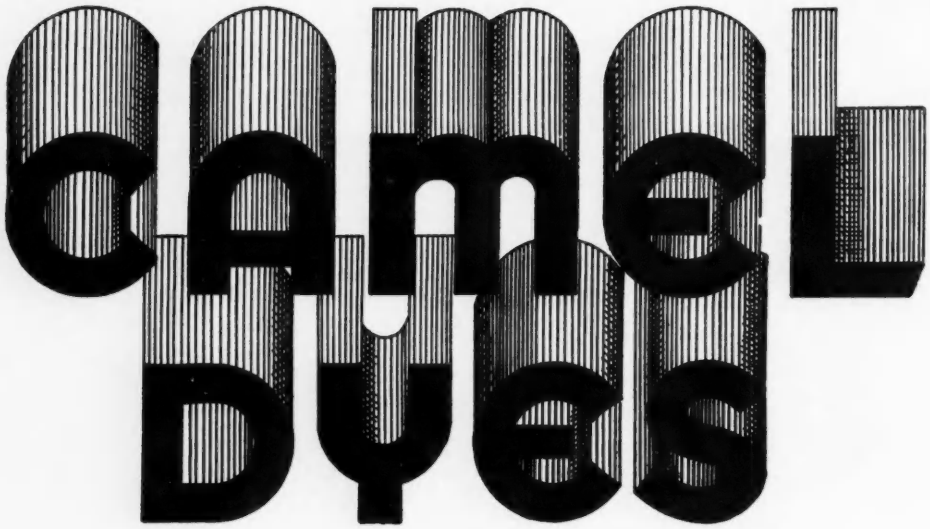

THE CAMEL LINE OF
DEPENDABLE DYESTUFFS

has served the textile mills of America
without interruption since
1876.

This broad experience assures
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TO MEET ALL DYESTUFF REQUIREMENTS

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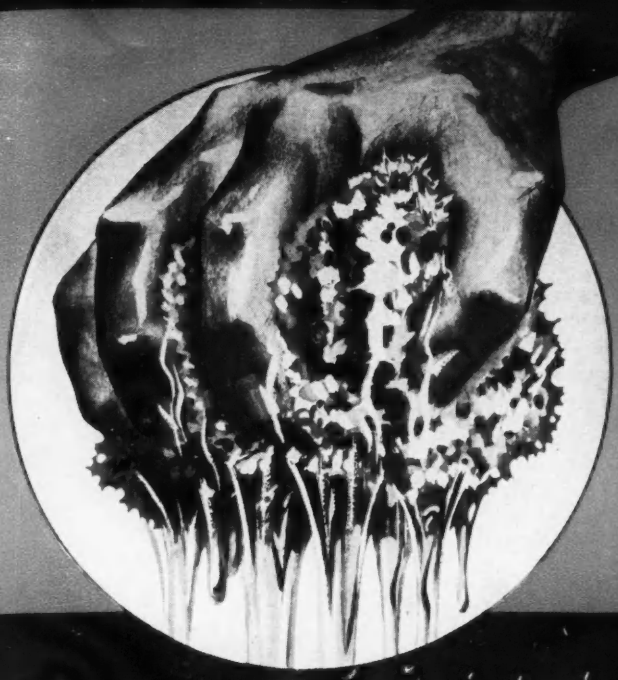
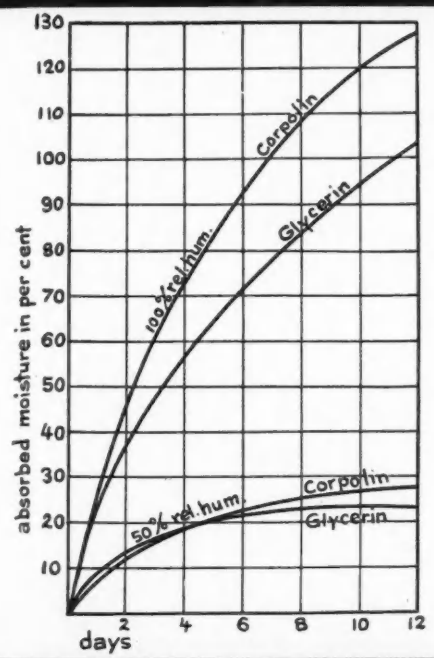


A POWERFUL COLLECTOR OF MOISTURE

CORPOLIN®

HYGROSCOPIC AND PLASTICIZING AGENT



FOR VAT PRINT PASTE

Corpolin is highly effective as an ingredient of vat print paste, absorbing the proper amount of moisture in the ager. Corpolin costs less than ½ as much as glycerine, which it replaces without change in formulation. Non-toxic and non-flammable, it is the finest humectant available at any price.

FOR SIZING

Corpolin is valuable as a sizing agent . . . it prevents the sized warps from becoming dry and brittle. Gelatine and glue are softened by Corpolin and prevented from gelatinizing.

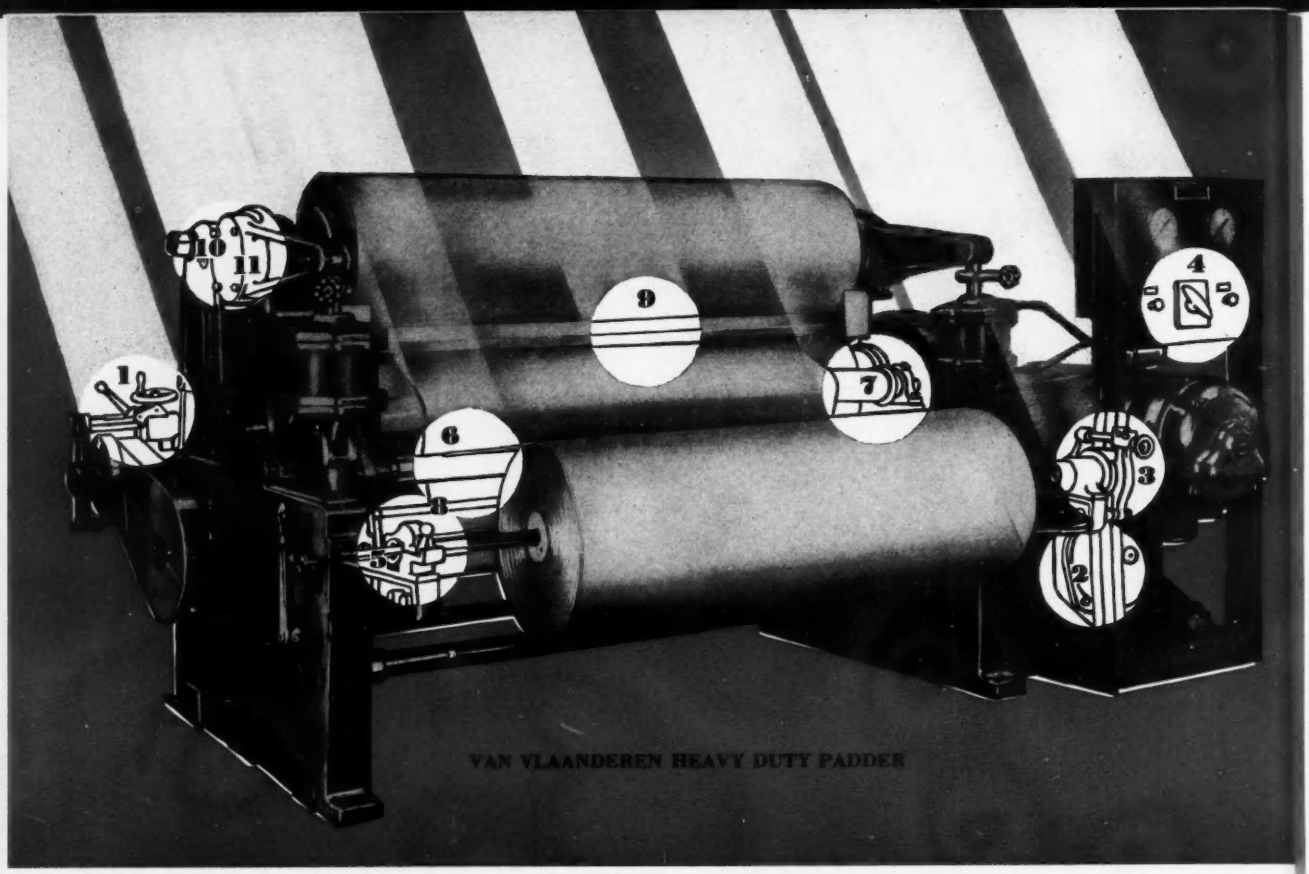
Write today for technical data sheet and samples. Prove Corpolin's effectiveness for your own process.

THE AKTIVIN DIVISION

HEYDEN CHEMICAL CORPORATION

393 SEVENTH AVENUE. NEW YORK I, N. Y.

HEYDEN CHEMICAL CORPORATION THE AKTIVIN DIVISION NEW YORK



SPOTLIGHT ON SUPERIORITY

Focus your attention on these points of superiority. They will stand out in the light of your experience in processing modern fabrics.

1. It has an entirely new slip clutch take-up. Operates through dual friction plates with sensitive tension control and quick acting engage and disengage lever.

2. Variable speed drive, coupled to worm gear reducer, gives quiet, smooth operation and saves considerable floor space.

3. Malleable iron block brakes have tension indicator for easy reading and brake shoes are independently mounted for smoother action.

4. Pneumatic pressure system controls each cylinder separately, allowing operator to equalize nip pressure.

5. Both let-off and take-up bars have positive center bar locks.

6. All guide rolls are mounted on anti-friction bearings and made of stainless steel.

7. Two rubber covered expanders with sealed ends are provided.

8. The stainless steel pan can be easily and quickly lowered for cleaning.

9. Splash guards and nip guard assure safe, clean operating conditions.

10. Padder rolls are mounted on spherical roller bearings for smooth trouble-free service.

11. Both rolls are easily removed.

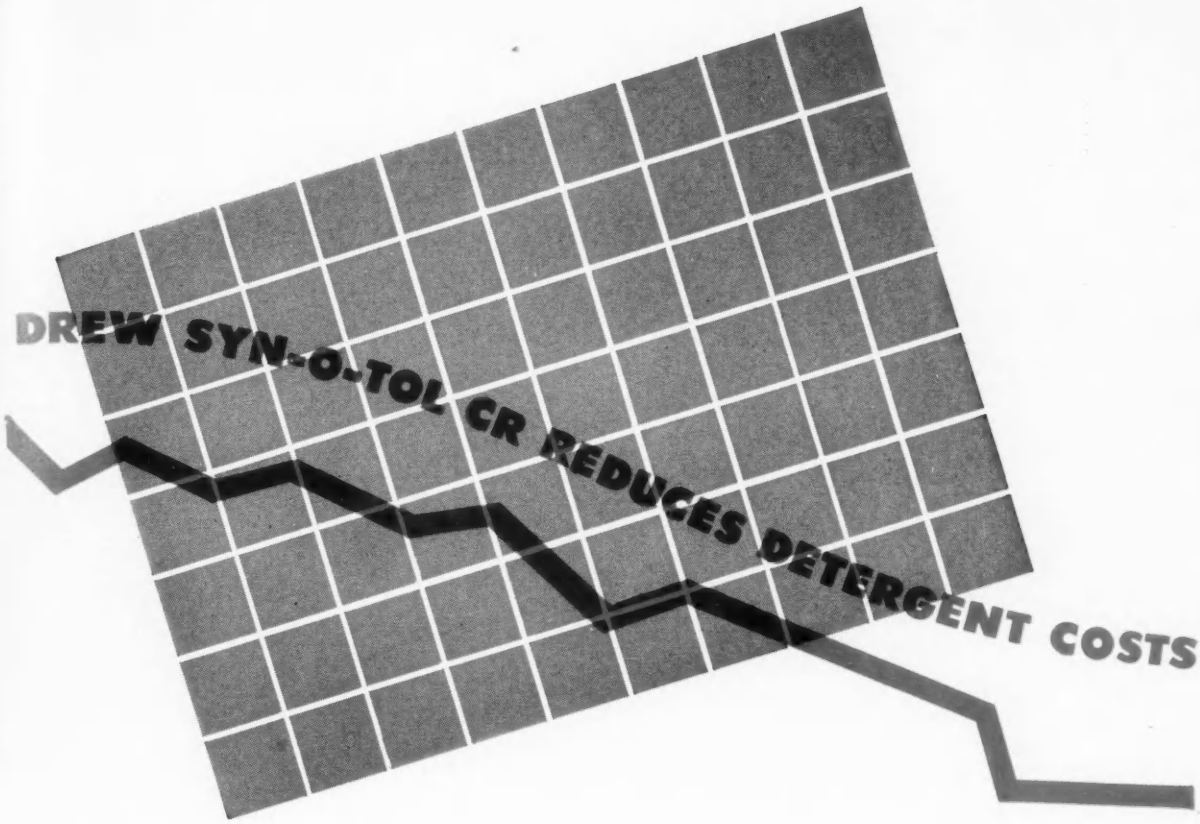
VAN VLAANDEREN

You are invited to see this machine.

MACHINE COMPANY

370 Straight Street, Paterson 3, New Jersey

World's largest manufacturer of machines for processing modern fabrics



SYN-O-TOL CR is a combination nonionic-anionic detergent, wetting agent and penetrant that combines the advantages of high concentration with ease of handling. It is highly effective in removing sizing material, oil, dirt, etc. It is excellent for use after enzyme desizing . . . a perfect preparation for dyeing. When used in boil-off, it insures maximum whiteness of fabric, freedom from impurities and high absorbency. It makes an ideal "soaping" agent for washing prints . . . will not cause bleeding . . . will not leave goods harsh or wiry.

SYN-O-TOL CR contains less than 5% of moisture. Its viscous "soapy" stock solutions at approximately 20% concentration, are a big factor in the reduction of waste.

Cut your detergent costs with SYN-O-TOL CR—Prepare 20% active material by mixing with water in your own plant.

Write for technical data today!

RAYONS—Scours out sizing material, oil, dirt, etc.

COTTONS—Insures maximum whiteness of fibre, freedom from impurities, high absorbency when used in kier or open boil.

DYEING—A perfect preparation for dyeing all fibres.

PRINTS—Efficient "soaping" agent for washing prints. Excellent suspending power. Removes printing vehicle . . . leaves grounds white . . . eliminates bleeding of design.

WOOL—Possesses all the useful properties of soap without its disadvantages. Ideal for raw grease wool, yarns and piece goods.

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E. F. DREW & CO., Inc.

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for wetting and dispersing purposes . . .

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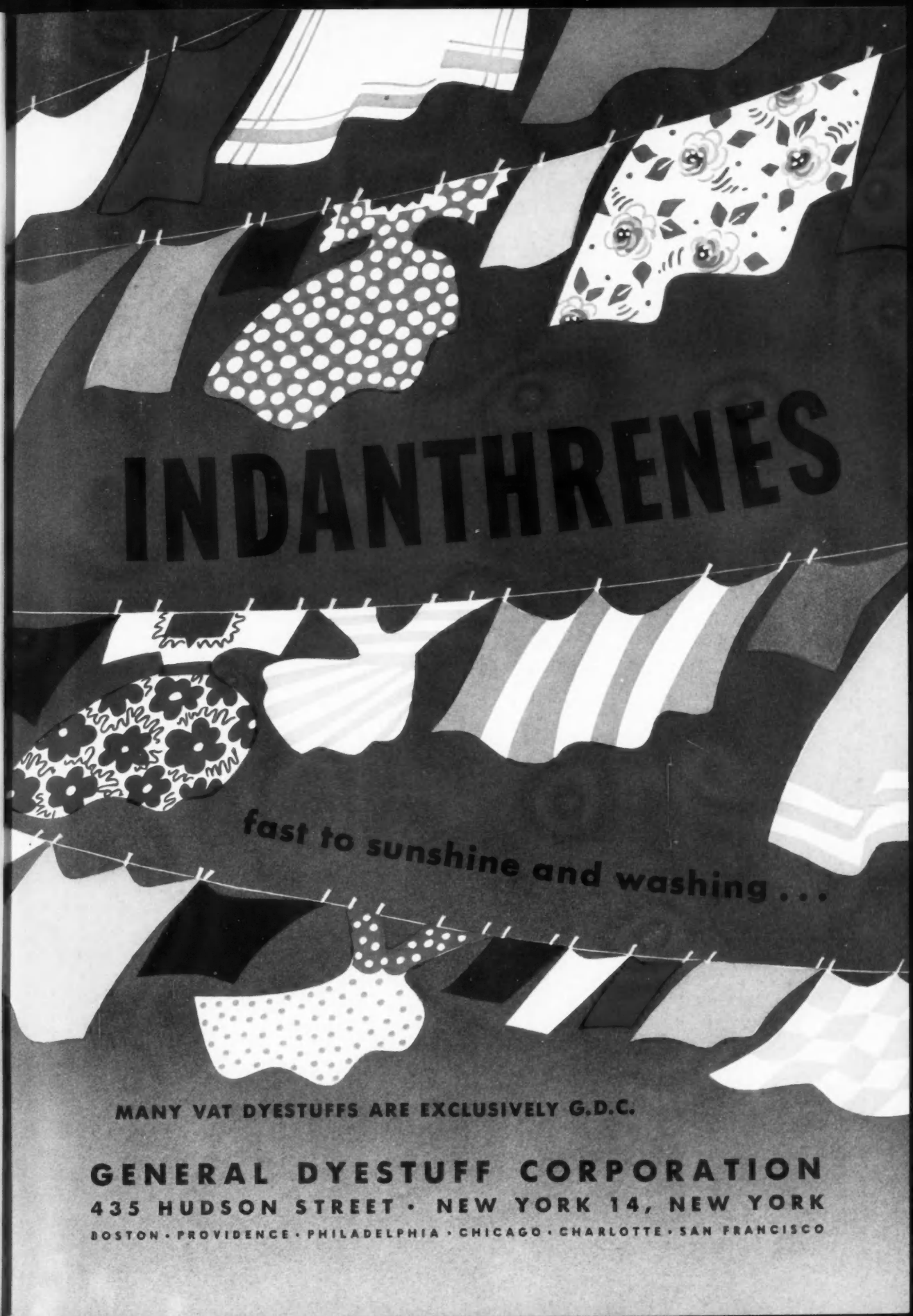
INDANTHRENES
fast to sunshine and washing . . .
MANY VAT DYESTUFFS ARE EXCLUSIVELY G.D.C.
GENERAL DYESTUFF CORPORATION
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BOSTON • PROVIDENCE • PHILADELPHIA • CHICAGO • CHARLOTTE • SAN FRANCISCO

Reduces Rayon 'Seconds'

'Hard Size' is minimized by a slower congealing warp size

Try a quick run-off in your mill. You'll find that **SPUNJEL** – a specially prepared warp sizing gum for spun rayon – will not congeal or set-up in the feed line or in the size box during normal operation. It was developed to minimize imperfection rejects caused by 'hard size.'

Photo courtesy of JANTZEN

SPUNJEL can also be worked into your present formula to greatly minimize 'set marks.' Its high adhesiveness and strong, flexible surface film actually increases the tensile strength of the yarn.

National
STARCH PRODUCTS

Address: 270 Madison Ave., New York 16; Boston, Philadelphia, Atlanta, Indianapolis, Chicago, San Francisco and other principal cities. In Canada: National Adhesives (Canada) Ltd., Toronto and Montreal.

We'd like to test these NATIONAL Textile Specialties and Starches:

- ☐ Please send test samples
- ☐ Have a representative call
- ☐ SPUNJEL (described above)
- ☐ AMBERTEX M for screen and machine printing
- ☐ FLOTEX to replace natural printing gums
- ☐ FLOCK ADHESIVE 970 for chenille printing
- ☐ FARILON for Rapidogen printing and backfilling
- ☐ FIBERJEL V for filament viscose sizing
- ☐ CLEARFILM for bright, lustrous finishes on cotton and rayons
- ☐ VAT THICKENER 36 for rayon and cotton

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Stantex* Coning Oils for NYLON

For hosiery, weaving and tricot yarns Stantex tested and proven oils of uniform high quality and stability insure—

- **Protection and lubrication for yarn and size**
- **Better cone build-up**
- **Improved knitting and weaving results**
- **Elimination of static**
- **Ease of removal in scouring**

STANTEX 125 **STANTEX 127**

STANTEX 152 **STANTEX 172**

Our experienced representatives will assist you to select the proper oil for your requirements. Write for full information.

* REG. U. S. Pat. Off.

STANDARD CHEMICAL PRODUCTS, INC.

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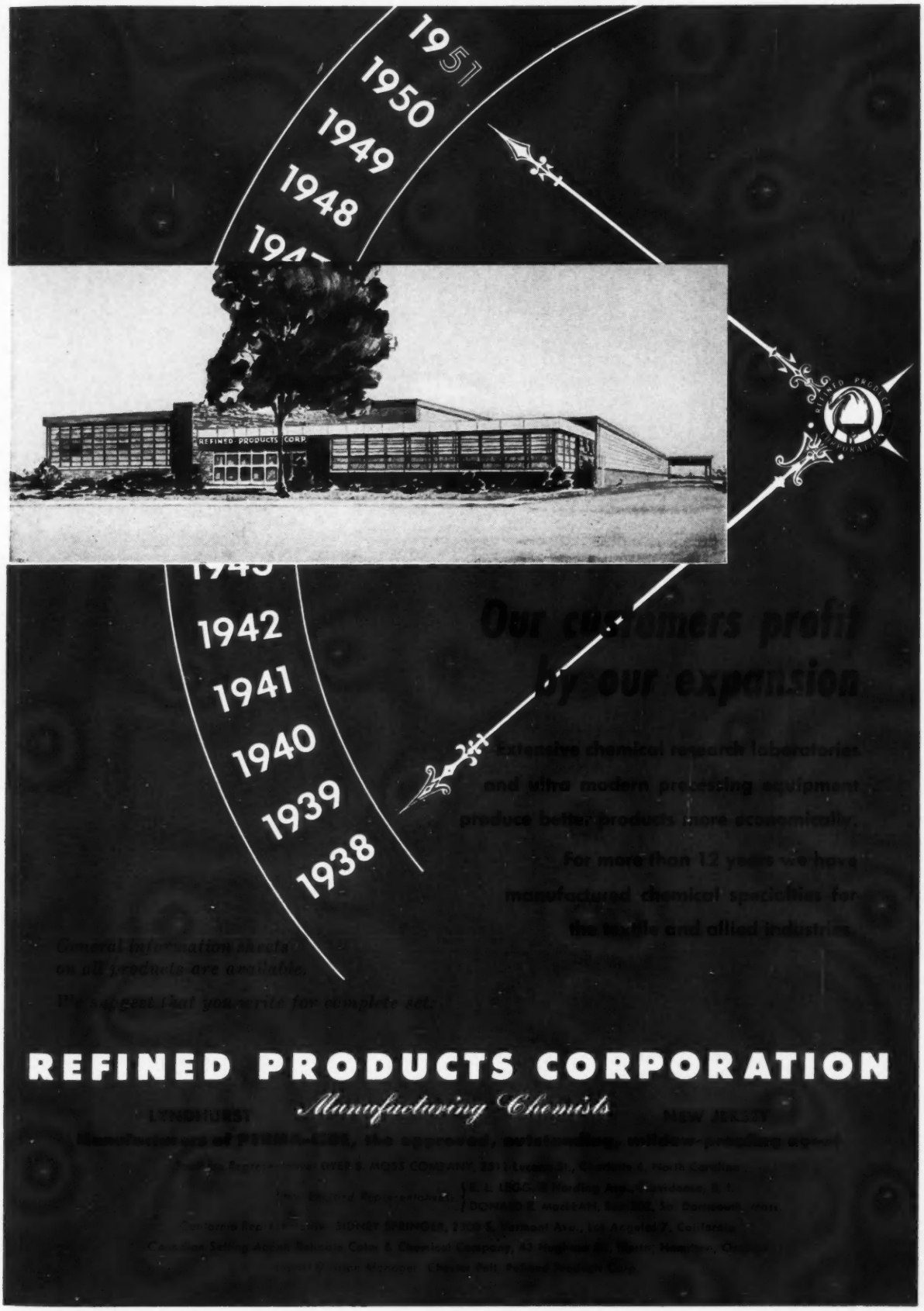
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REFINED PRODUCTS CORP.
Our customers profit by our expansion
Extensive chemical research laboratories and ultra modern processing equipment produce better products more economically.
For more than 12 years we have manufactured chemical specialties for the textile and allied industries.
General information sheets on all products are available.
We suggest that you write for complete set.
REFINED PRODUCTS CORPORATION
Manufacturing Chemists

The P.A. gets a new job

...and an old story!

THE PURCHASING AGENT said, "You again!"

The Calgon salesman reached out his hand. "Uh-huh. Congratulations on your new job. Anything I can do?"

"ANYTHING *you* can do?" the P.A. said after the handshake. "This isn't the woolen company, you know. Over there we had a dozen operations where the technical men wouldn't take anything but Calgon."

"Neither would you", the Calgon salesman reminded him, "after that time when . . ."

"LET'S SKIP THAT ONE", said the P.A., "I was new to the business then. How was I to know that our men would ever want technical service from your experts?"

"WHY NOT? Your men have so many problems that they can't possibly investigate all of them thoroughly, while our men are specialists in water treatment. For example — did you know that iron or copper in a raincoat fabric can mess up the vulcanizing process and that Calgon in the water supply prevents it?"

"I'll check into that one", said the P.A. "Raincoat fabrics are in our line".

AND "SO ARE RAYONS", the salesman reminded him. "Do you ever run into a case where the same lot shows variations in finish? Try shelling up the goods with water containing Calgon — and watch the smile on your finisher's face".

THE P.A. tried to break in. "That's interesting, but . . ."

"And", continued the salesman, "your dyer may have difficulty penetrating delustered acetate rayon fabrics. We can show him how he can lick that problem with Calgon".

THE P.A. tried again, but the salesman went right on. "Speaking of dyeing," he said, "You never have any scum on the dye bath when Calgon . . ."

With a mighty effort the P.A. cut in. "Save your breath", he advised. "One of the first things that greeted me here was a requisition for Calgon. I'll admit that you've given me some new ideas but you don't have to sell an old textile man like me on Calgon and Calgon Inc.

"SURE, I know. But, shucks, Calgon is such a good salesman for itself, that I have a tough time keeping my sales talk polished up, as I was saying . . ."

"AND, as *I* was saying, here's the order for Calgon — marked rush!"

"OKAY . . . OKAY." The Calgon man picked up his hat. "You really haven't changed a bit, have you?"

**T.M. Reg. U.S. Pat. Off.*

HAGAN
HALL
BUROMIN
CALGON

calgon, inc.

A SUBSIDIARY OF
HAGAN CORPORATION

HAGAN BUILDING
PITTSBURGH 30, PA.

PRECISION PADDING

with COLOR by

INDIGOSOL*

Indigosol Brown IBR

Through the modern methods of scientific precision padding, Indigosol Brown IBR insures perfect color reproduction for the extremely fast tan shades on cotton, viscose rayon and mixed goods for suitings, sheetings and dress goods.

Indigosol Brown IBR skillfully produces color at its best... colors that are most economical for light shades and extreme fastness. It is easy to apply, level, stable, readily dissolved, easily reserved and easily shaded.

Spur customers to action at the point of sale.
Get Indigosol Brown IBR . . . and profit!

Our application laboratories are daily solving new, difficult color-matching problems through the accuracy of precision padding and printing. Years of experience and research have equipped us to furnish the exact color you require . . . *exactly* — with speed, efficiency, economy. Write us now for full information.

*Reg. U. S. Pat. Off.

The exact color you require...exactly.

CARBIC Color & Chemical Company, Inc.

451-453 Washington St.
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Branches:
Philadelphia, Charlotte, Providence, Los Angeles, Hamilton, Ont.

Importer of the manufactures of Durand & Huguenin S. A. Basle, Switzerland

THE TEXTILE INDUSTRY IS RAPIDLY GOING CHEMICAL

New synthetic fibres necessitate changes in wet processing methods calling for new dyestuffs, new chemicals, new machinery.

Where then can you find the latest information on new DYESTUFFS, CHEMICALS, MACHINERY and EQUIPMENT?

The best source of information will be the ANNUAL PROCESSING REVIEW NUMBER, PUBLISHED DECEMBER 11th 1950.

At this particular time the issue will be of great practical value to all who are contributing to GOVERNMENT PROCUREMENT.

All reputable organizations who are producing products used in DYEING, BLEACHING AND FINISHING are invited to send us information on all such products provided they were

PLACED ON THE MARKET SINCE NOVEMBER 1949.

●

THIS IS A FREE SERVICE TO OUR READERS BUT THE INFORMATION MUST BE RECEIVED BEFORE NOVEMBER 6th, submitted as follows:

Information should include: the trade name of the product and a BRIEF summary of its uses. Please list each product on a separate sheet of paper. If illustrations are necessary, glossy photographs or black ink drawings should be furnished. If the trade name is registered or the product is patented and you wish this indicated, please so note.

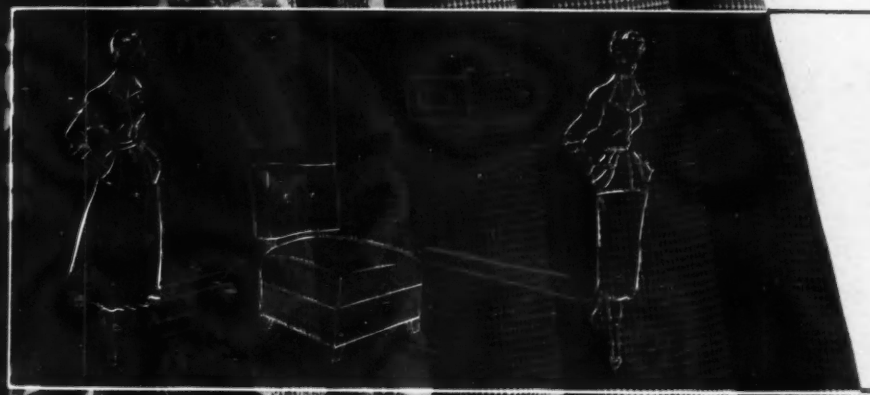
Incidentally, this issue is a very good one in which to advertise any products used in textile wet processing.

HOWES PUBLISHING COMPANY • 44 E. 23d St., New York 10, N. Y. • M. D. Reeser, Adv. Mgr.

Fastness to Light...

Without Aftertreatment!

This color is the first of a new range of Atlantic direct dyestuffs containing copper complexes as an integral part of the dye molecule. Since the copper complexes, which produce superior light and washing fastness, are already a part of the dyestuff, costly aftertreatment becomes unnecessary.



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OCTOBER 16, 1950
VOLUME 39 NUMBER 21

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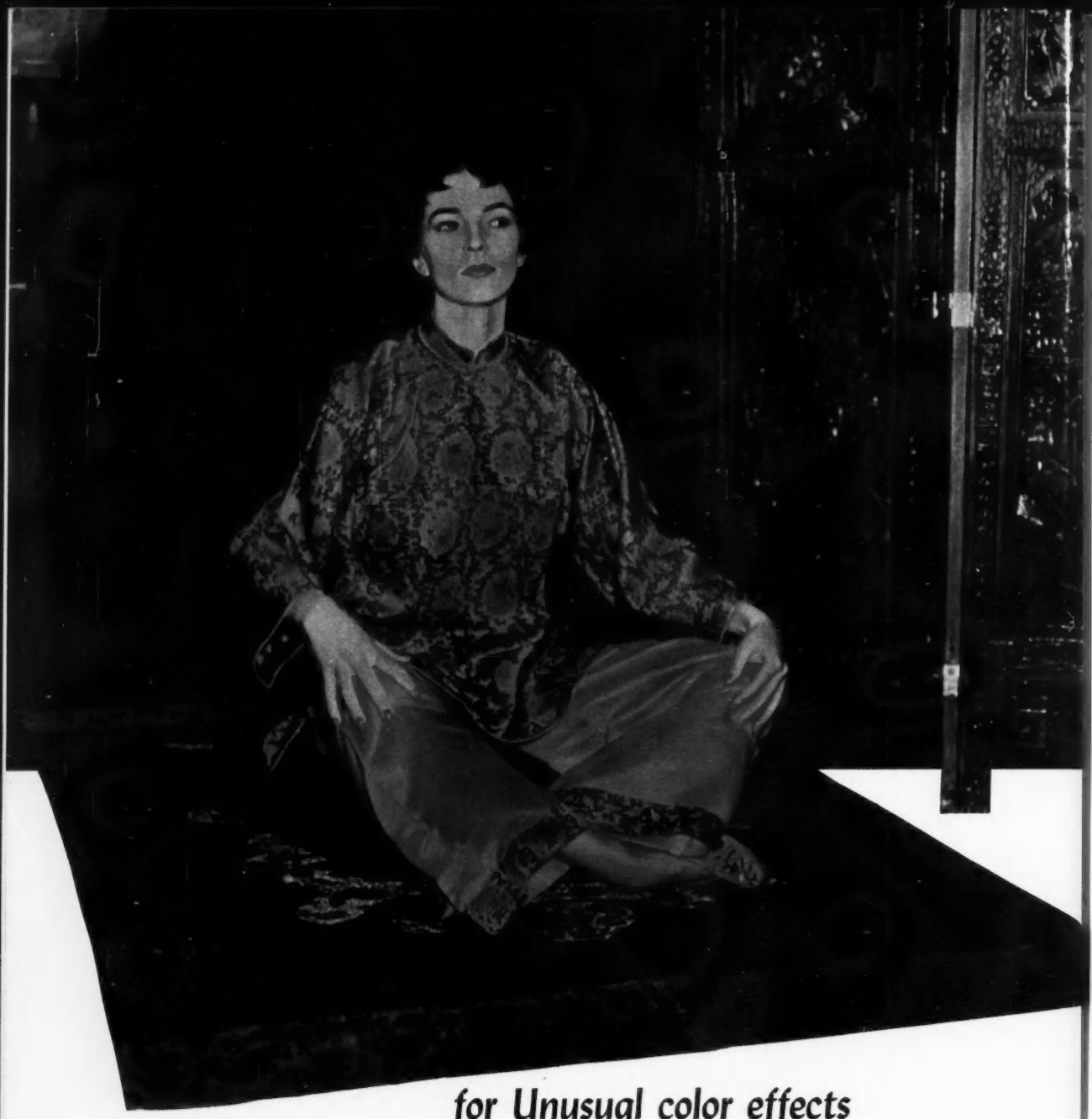

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THE DEVELOPMENT OF A REPRODUCIBLE TESTING TECHNIQUE USING THE TABER ABRASER ON RAYON FABRICS

MARGARET HARRIS ZOOK

Ellen H. Richards Institute
The Pennsylvania State College

INTRODUCTION

IN Report Number 1 of this series, the large number of machines and methods used currently in abrasion testing of textile fabrics was discussed. This report describes certain aspects of an investigation directed toward the standardization of the method of use of the Taber Abraser, a machine found in a large number of textile laboratories, and used widely for testing and research purposes.

An investigation of the methods of testing fabrics for abrasion resistance employed by various investigators using the Taber Abraser shows considerable variance in the methods used, as follows:

(a) The end-points chosen appear to fall into two general classes, namely—those which depend upon visual evidence of degradation and those based on loss in breaking strength due to abrasion.

(b) Generally, abrasive wheels of two types are used, namely—calibrase wheels designated as CS 10 of medium roughness, and calibrase wheels designated as CS 8 of a smooth texture.

(c) Some laboratories attempt to keep their instruments in statistical control, but most of them make no attempt so to do.

(d) Certain operators use a vacuum to remove detritus, while others depend on the use of a brush, manually operated.

Faced with this variety of conditions, an arbitrary test procedure based on the general suggestions of the *Taber Manual (5)*, modified by some of the techniques used by those employing the Taber machine, served as a starting point for the present study, the purpose of which was to develop an abrasion test procedure for the use of this equipment which could be duplicated with reliability.

This is the second in a series of reports on methodology studies relating to the testing of textile fabrics for resistance to abrasion, from the laboratories of the Ellen H. Richards Institute, sponsored by the American Viscose Corporation.

Scope.—The investigation herein described included the following phases of the problem of standardizing an abrasion procedure for the Taber Abraser:

A. A method for statistical control of the machine was set up and used.

B. A preliminary study of the reproducibility of results obtained on the Taber Abraser was made, using an arbitrary test method developed after a review of various test methods currently in use.

C. Consideration was given to the variables affecting the reproducibility of results, and an improved three-wheel test method, designed to increase the reliability of the test, was suggested and used.

At this point it should be noted that the basic idea for the three-wheel abrasion technique as developed in this report, together with the suggestion for an improved method of mounting were suggested by Frank O'Neill of Pacific Mills at the October, 1946, meeting of the Special Committee on Abrasion, American Society for Testing Materials.

METHODS OF PROCEDURE

APPARATUS—The Taber Abraser Standard Research Model E-4010 was used for the study, together with such accessories as the Vacuum Pickup Attachment Model 100-108 and the Powerstat Regulator for removing detritus from the abraded sample, the five-power Illuminated Magnifier as an aid in the determination of visual damage, and the Duplex Refacing Store ST-11 for refacing the wheels.

FABRICS—Twelve fabrics were used in the study. They consisted of a variety of weave and yarn types and included a wide range of weights. Table I lists the experimental fabrics according to increasing weight.

CONTROL OF THE TABER ABRASER—An attempt was made to check and control the variables in the abrasion test by setting up a statistical method of control. A standard control chart similar to that used by the textile technologists of the Philadelphia Quartermaster Depot on the Wyzenbeek machine was adopted for this study.

The criterion for judging standardization is based on the laws of chance variation of tested samples. Failure to satisfy the criterion is taken as evidence of an assignable cause of variation. Continued use of the control chart and of check tests during this investigation have aided in the recognition and elimination of variations resulting from causes outside of the range of chance, and in the control of

TABLE I
CONSTRUCTION OF EXPERIMENTAL FABRICS USED IN THE STUDY

Fabric	Weight in Ounces per Square Yard	Fiber		Weave	Thread Count		Yarn Type	
		Warp	Filling		Warp	Filling	Warp	Filling
1. Blue Satin	2.5	Acetate	Acetate	Satin-5 shaft	197	70	Single	Single
2. Chartreuse Taffeta	2.5	Acetate	Acetate	Plain	180	62	Single	Single
3. Blue Twalle	2.6	Viscose	Viscose	Plain	95	71	Single	Single
4. Rose Twalle	2.7	Viscose	Viscose	Plain	96	71	Single	Single
5. Cream Fuji	3.4	Viscose	Viscose	Plain	112	71	Single	Single
6. Blue Gabardine	4.6	Viscose	Viscose	2-2 Twill	132	64	Single	Single
7. Tan Gabardine	4.8	Viscose Cotton	Viscose	2-2 Twill	134	65	Single	Single
8. Satin Lining	5.2	Viscose	Viscose	Satin-5 shaft	185	72	Single	Single
9. Red Salyna	5.6	Cotton Viscose	Viscose Cotton	Plain	48	40	2-ply	2-ply
10. Tackletwill A	5.6	Viscose	Cotton	2-1 Twill	162	76	Single	Single
11. Tackletwill B	6.2	Viscose	Cotton	2-1 Twill	162	68	Single	2-ply
12. Tackletwill C	6.7	Viscose	Cotton	2-1 Twill	164	70	Single	2-ply

the processes to such an extent that satisfactorily uniform results may be obtained.

The *Standard Control Chart*, Figure 1, was set up for the machine at the beginning of the investigation since the machine was new at this time. A control check then was run each week during the investigation in order to determine the performance of the machine. Similar checks were run on each new set of wheels; this usually involved testing six pairs at one time.

The control test fabric selected was a cotton unbleached muslin with the following specifications:

Thread Count—Warp 64
Filling 64
Breaking Strength—Warp 54.78
Filling 55.98
Weight—Ounces per square yard.. 4.7

The fabric selected as the control was chosen for the following reasons:

(1) It was easy to mount on the turntable;
(2) The grainline of the fabric was sufficiently clear to obviate difficulty in ravelling the strength strips;
(3) The fabric was satisfactorily uniform in texture, since no dyeing and finishing processes had been used thereon;
(4) It was found by repeated tests that no refinishing of the wheels was necessary during the check tests with this fabric. This helped to reduce the time required for the test; and it saved wear on the wheels;
(5) The fabric is one of standard weave, and the supply can be replenished, although enough of the fabric should be on hand to run a comparative check when purchasing more yardage;
(6) There is no right or wrong surface to the fabric, and the warp and filling directions are sufficiently distinguishable to eliminate the need for marking.

Two thousand six-inch squares were cut from the control fabric and mixed thoroughly before stacking for use, to provide random sampling.

All tests were carried out in a constant temperature and humidity room with the temperature maintained at 70°F.±2° and

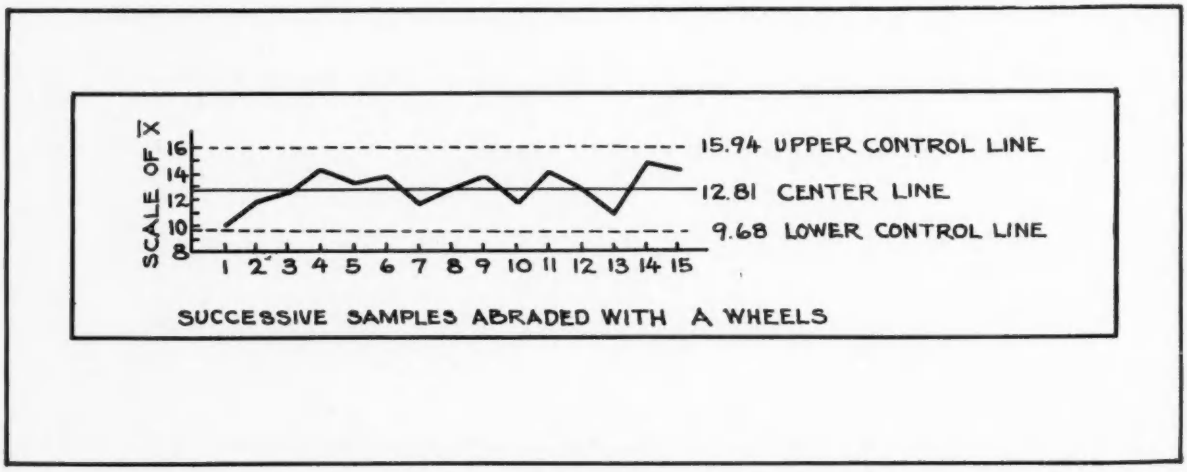

Figure 1

Standard Control Chart

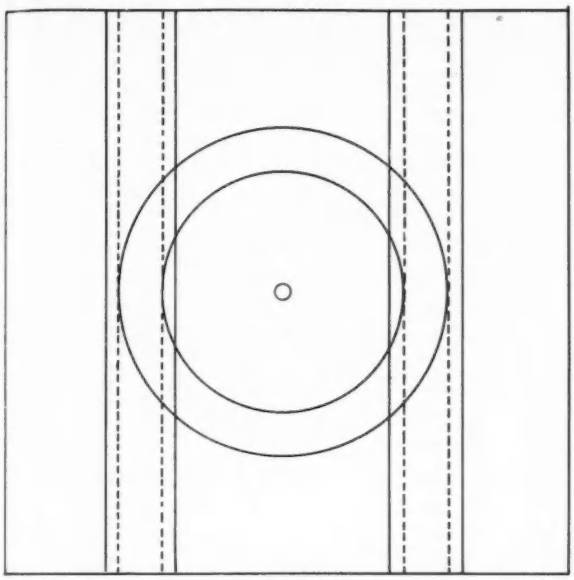

Figure 2

Diagram Showing the Abraded Area of Test Swatches and the Location of Strength Strips in the One Direction

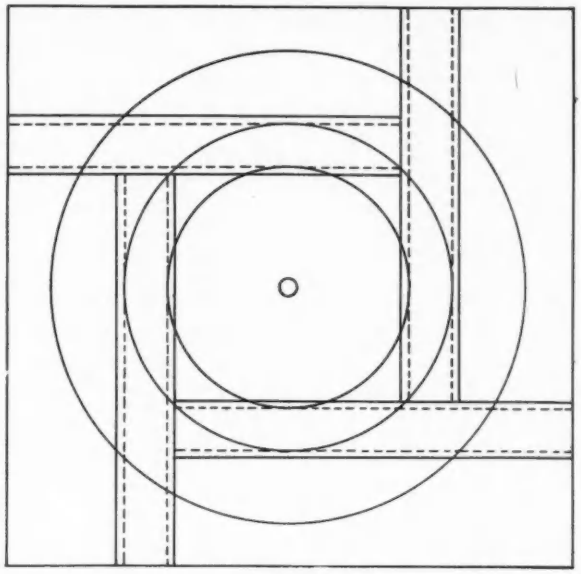

Figure 3

Selection of Breaking Strength Strips in the Two Directions from Samples after Abrasion with the Taber Abraser

a relative humidity of 65±2 per cent. Fabrics were conditioned for 24 hours in order to permit them to reach moisture equilibrium before being used for a test.

New wheels were refaced on an ST-11 Duplex Refacing Stone on the rough side for 100 cycles. In later tests using the same wheels, the wheels were refaced 25 cycles at the beginning of each check test.

No further refacing of the wheels was done during any one test, since the results were as consistent without as with this additional refacing. After refacing, the loose rubber particles were removed by spinning the wheels against a camel's hair brush. Six pairs of wheels were checked at one time. From these six, two pairs of very similar wheels were reserved for future control tests on the machine.

All wheels which fell within the range of chance as established by the control test were used, although they may have varied slightly toward greater or lesser coarseness within the established limits.

The unbleached muslin squares were mounted carefully, in order to give a smooth surface when the powerstat regulator controlling the vacuum is set at 30. This was sufficient to remove the detritus and emery particles accumulating during the test. The samples were kept in order as they received the abrasion treatment. From the 30 test samples of each series, 60 three-fourths inch strips were cut from the abraded pieces, and were ravelled to a one-half inch width, which included the width of the abraded portion.

Only warp strips with the abrasion direction parallel to the warp yarns, as shown in Figure 2, were used in the breaking strength tests, since the warp yarns were found to show the greater breakdown, and since they ruptured first. The strips then were subjected to the breaking strength test on the Scott pendulum type tester, with a lower jaw speed of 12 inches per minute, and a spread between the jaws of three inches.

Calculations of the results were made by using the control chart method explained in *The American Society for Testing Materials Manual for the Presentation of Data (1).* From these calculations, the control chart shown in Figure 1, already cited, was formulated and used as a standard for checking all of the CS 10 wheels, as well as the machine performance.

EXPLANATION OF THE CALCULATIONS—The 60 breaking strength results were divided into 15 groups each with four results. Therefore in the calculation of data, the factors used were the following:

$N = 15$

$n = 4$

Adding the 15 $\overline{X}$, and dividing by $N = \overline{\overline{X}}$ (grand average).

Adding the 15 R, and dividing by $N = \overline{R}$ (average range)

The $\overline{\overline{X}}$ gives the central line when constructing a control chart for averages.

$\overline{\overline{X}} \pm A_2\overline{R}$ gives the upper and lower class limits to the chart—that is, it sets the boundaries within which the variations may be due to chance and outside of which may be due to assignable causes. A_2 is a factor taken from Table I, page 50, of the *ASTM Manual for Presentation of Data (1),* as cited previously, and is derived from the following equation:

$$\overline{\overline{X}} \pm 3\frac{R}{d_2\sqrt{n}}$$

This formula is used as a substitute for calculating the standard deviation and determining upper and lower class limits from three standard deviations.

TESTING PROCEDURE FOR TESTING THE EXPERIMENTAL FABRICS—Preliminary Testing Procedure.—Six-inch squares were cut from the fabric undergoing the test, so that no set of five contained the same set of warp or filling yarns. Test samples were conditioned before a test at least for 24 hours at a temperature of 70°F±2° and a relative humidity of 65±2 per cent.

Wheels and pressures were used as directed in the Taber Manual *(5),* which suggested CS 8 wheels with 250 grams pressure for light-weight fabrics, and CS 10 wheels with 500 grams pressure for heavy fabrics. For this reason, CS 8 wheels with 250 grams of pressure were used for Fabrics 1 to 7, and CS 10 wheels with 500 grams pressure for Fabrics 8 to 12, inclusive.

The wheels were refaced 25 cycles at the beginning of each test, and 10 cycles every 500 cycles during the abrasion of each sample. The number of cycles used for refacing during the test was deducted from the cycle readings.

Five samples were abraded to each of the cycle stations decided upon for the particular fabric. For those with low resistance to abrasion, cycle stations of 25 were used; for those moderately resistant,

cycle stations of 50, and for those with high resistance, cycle stations of 100 or 200 seemed sufficient. Thus, five samples each were abraded 25 cycles, then five more were abraded 50 cycles, and so on, always abrading five samples to each cycle station before going to the next higher station. Since this was a preliminary test to check for reproducibility of results, no definite final end-point was selected, but the percentage loss in strength at fairly close intervals was charted.

The vacuum with the suction regulated according to the requirements of each fabric was used.

One sample of each series was saved for reference. From the other four abraded swatches, 16 modified strength strips—eight in the warp direction and eight in the filling—were cut and ravelled to a one-half inch width, which included the abraded area as shown in Figure 3. These were tested according to the specifications for the ravel strip method of the Commercial Standards CS59-44, paragraph 11, using a pendulum type Scott tester as mentioned above.

The fabrics were abraded and tested under the same controlled atmospheric conditions as previously described.

THREE WHEEL TESTING PROCEDURE—Results of the preliminary test procedure showed that an improved method needed to be developed particularly if light-weight fabrics were to be tested for abrasive resistance. Analysis of this test procedure suggested that possible sources of inconsistency in the results might have resulted from any or a combination of the following:

(1) Use of an insufficient number of samples;
(2) Variable tension resulting from the mounting of the test swatches;
(3) Lack of uniformity throughout the abradant wheels;
(4) Differences between pairs of wheels;
(5) Inadequate refacing of the wheels;
(6) Inaccurate marking and cutting of the strength strips, particularly where the abrasive path was not clearly visible.

In order to control certain of these variables, several changes in procedure were made as outlined below.

Random Sampling of Fabric.—An estimated number of samples necessary to complete the test was cut and thoroughly mixed in a box and then drawn from the box and stacked for use.

Checking of Abradant Wheels.—Each pair of new wheels was checked against the control pair as previously explained.

Allowing for Variability within Each Pair of Wheels.—Three pairs of wheels were used for each test, and four specimens were abraded to each cycle station. Two specimens were abraded by a pair of wheels the variation of which was shown by its control check to follow closely the central line. One specimen was run by one pair of wheels the control test of which showed it to vary toward roughness; and another specimen by the third pair of wheels which varied toward smoothness. The purpose of this method was to make use of wheels which varied from the control wheels slightly more than that allowed by chance. In every case the smooth wheels were balanced by the use of a pair of rough wheels. This perhaps leads to greater variation in the results, but the cost of the wheels prohibits discarding them. Also, the average obtained from the rough and smoother wheels equalizes the final average. In addition to the care exercised in the selection and mounting of the wheels, one sample was run to each end-point before the second specimen was taken to the same end-point.

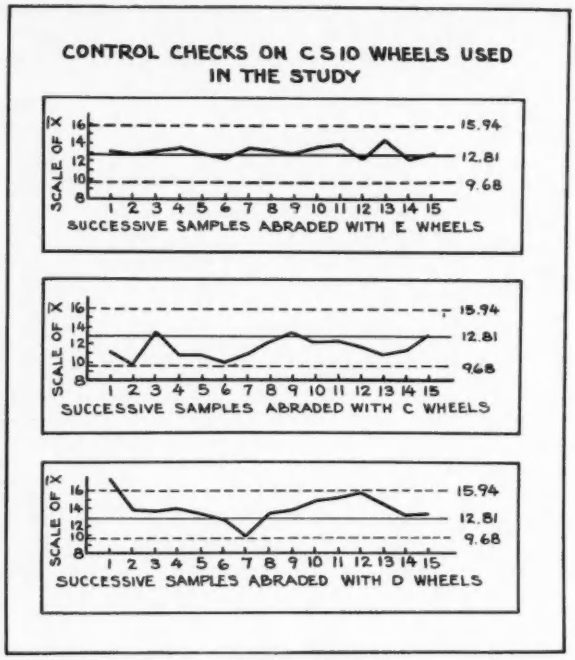

Figure 4

Representative Control Charts Produced by Abrasion Wheels on Control Fabric

Control Checking of the Machine.—Control checks were run each week on the machine to assess its performance.

Mounting of Samples.—It was noted that, in the mounting of the fabrics, the tightening of the screw on the ring clamp after the fabric was in place caused the release of a certain amount of tension which might exist on the filling direction of the fabric, thus allowing the warp yarns to lie in closer relationship to one another and also to give a looseness to the fabric on the turntable. In order to prevent this, the following method was established and used during the remainder of the tests.

After cutting a hole in the center of the fabric just sufficiently large to pass easily over the center screw without causing binding, but not too large to cause stretching, the fabric was placed on the turntable, and the center washer and nut were partially tightened with the screw of the clamp at one end of the warp diameter. The ring clamp, screwed as tightly as possible, and still large enough to permit pushing over the turntable and fabric, was pushed down evenly with the palm of the hands on opposite sides of the ring clamp moving around the outer edge. The ring clamp was pushed over the turntable, rather than the turntable into the ring clamp. The ring clamp was loosened as necessary to permit pushing completely into place. This process cannot proceed too rapidly, particularly in fabrics which release air with difficulty. The center nut was tightened completely at the end of the operation.

Refacing the Wheels.—The wheels were refaced at the beginning of each new test on the rough side of the emery refacing stone for 25 cycles, or until all traces of color from previous tests had been removed. The wheels then were revolved lightly against a camel's hair brush to remove loose rubber and emery particles. In case of the tackletwills, which contained a finish, it was found to be necessary to reface the wheels until the green color of the wheels became evident. Otherwise the clogged wheels were less effective in their destructive action on the

fabric. Between tests, the wheels were abraded 10 cycles on the fine side of the emery stone every 500 cycles.

Marking of the Abraded Area.—In order to assure proper marking of the location of the abraded area for the cutting of strength strips, a gauge was designed to guide the marking before removing the ring clamp and fabric from the turntable.

PRESENTATION OF DATA

Figure 4 shows representative control checks produced by wheels used in the study. Figures 5 and 6 give comparisons of the percentage losses in warp and filling breaking strengths, respectively, produced by the preliminary test procedure and the three-wheel abrasion technique.

DISCUSSION

STANDARD CONTROL CHART—The results of the standard control test placed the central line or grand average at 12.81 pounds breaking strength after exposure of the control fabric to 250 abrasion cycles under the conditions described under the section of this report on *Methods of Procedure.*

Also, an upper control limit of 15.94 pounds and a lower control limit of 9.68 pounds was established. These two limits represent three standard deviations in either direction of the central line and should, according to Hamby *(3)*, include 99.73 per cent of all points.

Regular checkings of the machine showed no change to points outside of those allowed by chance during this investigation. Control checks for the CS 10 wheels, however, showed that variations existed in the test results when different pairs of wheels were used. Examples of the checks on wheels are shown in Figure 4, already cited. As can be seen, the E wheels follow closely the central line. C and D wheels, however, show some variation, the C wheels deviating toward roughness and the D wheels toward smoothness of the abrasive surface. In all cases, however, the points were predominantly within the control limits. Variations of several points in succession in one direction or another suggested the possibility that the individual wheels themselves were not consistent throughout.

A control chart for the CS 8 wheels established a central line of 17.15 pounds of breaking strength, with an allowable range of 13.63 to 20.67 pounds. Similar results appeared as with the CS 10 wheels. In two cases out of the six pairs of wheels tested, the wheels deviated toward lesser and greater roughness.

It was noted during these tests that the wheels gave essentially the same performance when run completely to the black line as drawn thereon to point out the time when they should be discarded. It was noted also that any pair of wheels must be used only in the combination as tested; and they also must be employed in every case on the same side of the

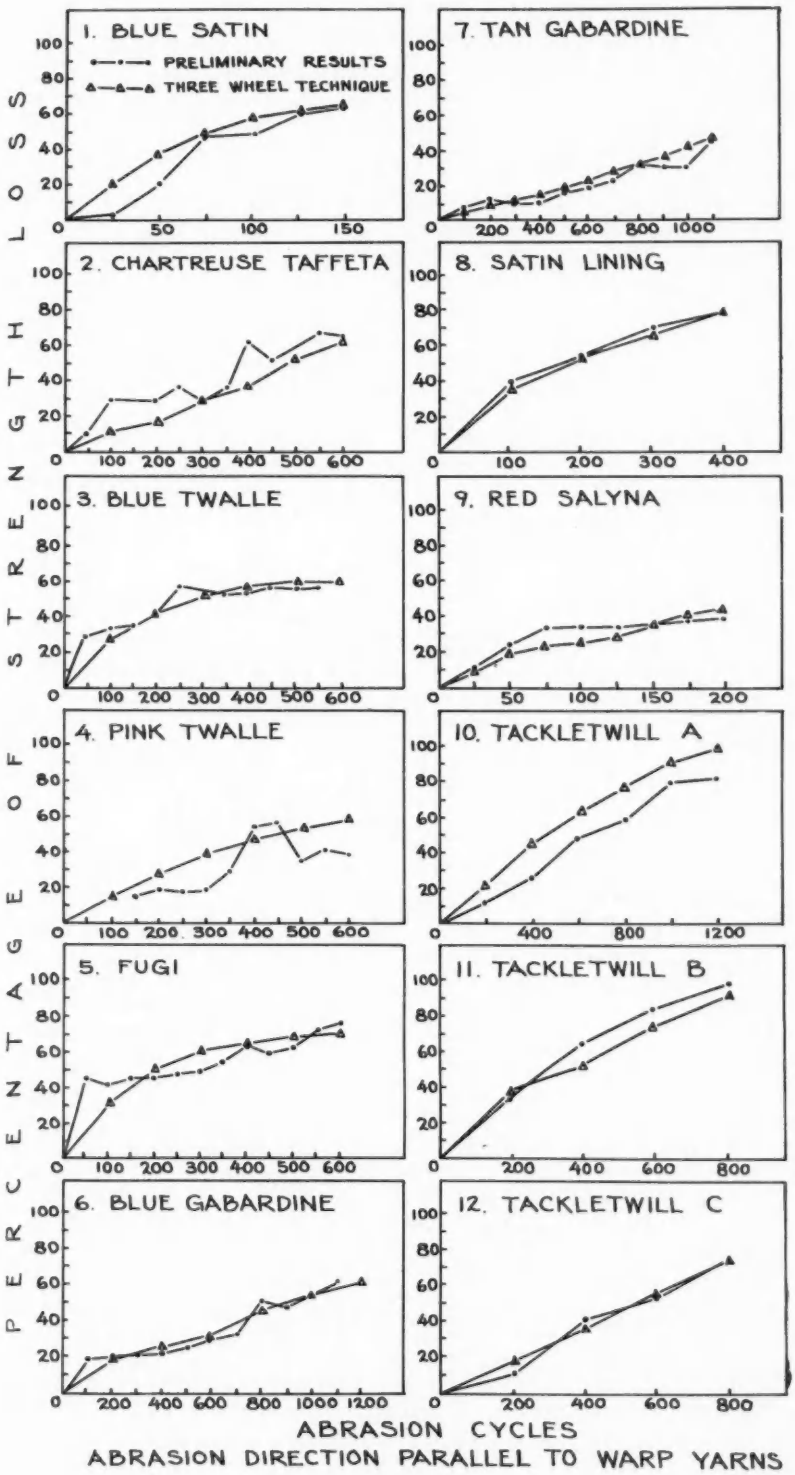

Figure 5

A Comparison of the Percentage Loss in Warp Breaking Strength Produced by the Preliminary Test Procedure and the Three-Wheel Abrasion Technique

frame, right or left, in order to give the same results. This may be due to a difference existing between any two wheels in a pair, and to the amount of work accomplished by each wheel as a result of its relative position.

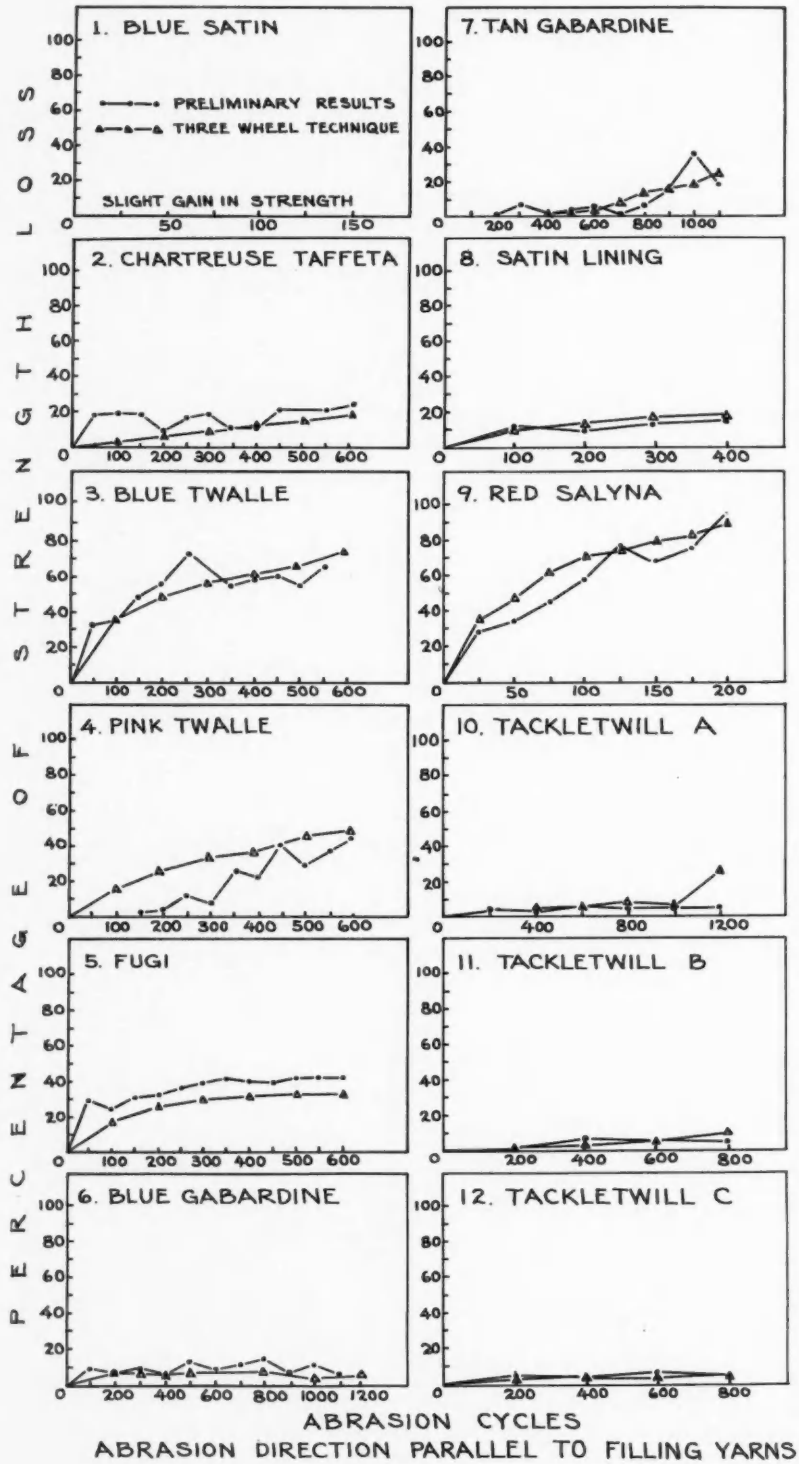

Figure 6

A Comparison of the Percentage Loss in Filling Breaking Strength Produced by the Preliminary Test Procedure and the Three-Wheel Abrasion Technique.

PRELIMINARY ABRASION TEST PROCEDURE USED WITH THE TABER ABRASER—Since the purpose of the test was to determine whether or not the results were reproducible, cycle stations were relatively close. The figures showed that too much variation was appearing in the percentage loss in strength of the fabrics subjected to an increasing number of cycles. This variation seemed somewhat greater than that reported by Kaswell *(4)*, who worked on three heavy cotton fabrics or Hamburger and Lee *(2)*, who subjected two lining fabrics to successively increased cycle stations. A partial explanation may be found in the fact that the tests of these investigators were made on heavier fabrics, while many of the fabrics employed in the present study were of lighter weight. Although the breakdown showed, in general, a gradual increase, the percentage of strength loss at a higher cycle station sometimes was considerably lower than at a previous cycle end-point. This was noted particularly in Fabrics 2, 3, 4, 5, 7, and 9, which in general were in the light weight range. The Satin Lining and Tackletwills A, B and C showed a smoother curve, probably because of the increase in distance between cycle stations.

If the abrasion test using the Taber Abraser were to be used on lighter weight fabrics, either alone or in combination with other tests, however, the author felt that a method of producing somewhat more consistent results needs to be found.

THREE-WHEEL ABRASION TECHNIQUE FOR THE TABER ABRASER—Consideration of the possible causes of inconsistency in results with the abrasion technique involving one pair of wheels led to the development by the author of the abrasion technique using three pairs of wheels described under the section on *Methods of Procedure.*

Special attention was given to the selection of the wheels to be used for testing, to sampling, and to the mounting of the fabric on the turntable, since it seemed that the other variables were controlled as carefully as possible, and that greater precision still was desirable.

The same combinations of wheels and pressures were used as in the preliminary portion of this study.

Much improvement was shown in the consistency of the average breaking strength loss values resulting from the three-wheel method, and much smoother curves were obtained, although the general directions of the curves were much the same as those obtained with the preliminary test procedure.

All in all, the use of three pairs of wheels tended to counteract the variations existing within wheels and between pairs of wheels. The use of three pairs of wheels therefore is recommended as giv-

ing more consistent results, although the results were of a similar order of magnitude as those obtained by using one pair of wheels.

SUMMARY

A method of checking and controlling the operation of the Taber Abraser was adapted and used. A cotton unbleached muslin fabric was selected as a control fabric, and a standard control chart was established by means of which the machine performance could be checked each week, and new pairs of wheels could be evaluated for their abrasive quality.

It was observed that variations existed between pairs of wheels. By checking them against a standard, wheels of greater or lesser roughness than that allowed by chance variations could be recognized.

A preliminary study of the reproducibility of results obtained on the Taber Abraser was made, using an arbitrary method developed as a result of a review of the various test methods in use.

Considerable deviation occurred in the abrasion test results on the rayon fabrics at various cycle stations. This suggested the possibility that variations existed not only between the abrasive wheels, but also within wheels.

Consideration was given to the variables affecting the reproducibility of results, and an improved method of mounting the fabric was suggested and used.

The change in technique of mounting the sample and the use of three selected pairs of wheels tended to reduce variations which existed within wheels so that more consistent results were obtained.

ACKNOWLEDGMENTS

The author is indebted to the American Viscose Corporation under whose sponsorship the study was made through a fellowship supported in the Ellen H. Richards Institute, School of Chemistry and Physics, The Pennsylvania State College.

The author, moreover, is grateful to Dr. Pauline Beery Mack, Director of the Ellen H. Richards Institute, The Pennsylvania State College, for her encouragement in the pursuit of this problem and to the Ellen H. Richards Institute for the provision of the physical means for undertaking this investigation.

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ABSTRACTS

Scouring with Synthetic Detergents

Anon., *Dyer & Textile Printer* 104, 91-4, July 28, 1950.

The problems associated with the use of synthetic detergents for scouring wool still do not seem to be completely solved. There are three groups concerned in this problem. They are the wool scourers, the sewage disposal authorities, and the manufacturers of synthetic detergents, and to get a clear picture of the problem it is worth considering how the subject appears to these three groups.

The wool scourer finds that synthetic detergents give excellent results both for wool scouring and for yarn scouring. They appear to give a better scour than soap, often at a lower cost, and to give a product that can be dyed to brighter shades. Difficulties with fats formed by the cracking of soap in dyebaths and with insoluble calcium soaps are avoided. In the case of yarn the tendency to felt or mat is reduced.

The only serious drawback to the large-scale use of synthetic detergents is the possibility that they may interfere seriously with the proper functioning of sewage disposal systems. The authorities controlling these systems have in mind the calamitous consequences that might ensue if they ceased to work properly, as might conceivably happen if the biological filter beds became poisoned by the suspensoids that reached them, and which, in the absence of synthetic detergents, would have been removed in the sedimentation process. There can be no doubt that the synthetic detergents interfere with sedimentation, particularly in the case of effluents rich in grease.

The manufacturers of the synthetic detergents evidently think that the possibilities of dangerous consequences ensuing from their use have been exaggerated. It seems clear that collaborative work between detergent manufacturer, sewage technician and wool scourer is required on a much bigger scale than has hitherto taken place.

Moth Farm to Fight Clothes Pest. Britain's Efforts to Preserve Woolen Textiles

K. McGarry, *Indian Textile J.* 60, 656-8, May, 1950.

This is an account of a service that has just begun to operate at the Bradford Conditioning House, at Bradford, Yorkshire, England, to test the efficiency of mothproofing agents. The backbone of this service is the "moth farm", where clothes moths are propagated for testing purposes.

The Bradford Moth Farm is helping Britain's textile trade to ensure packing protection, for a great deal of the damage to textile exports is done inside the packing cases during the voyage overseas. Some of Britain's markets are in countries with humid climates where the moth menace is far greater than in England. Customers in those countries insist on many exports being mothproofed, especially the upholstery of cars and furniture, woolen underwear, knitted goods and so on.

One can get an idea how important this fight is by the fact that, under favorable conditions, the family of one single clothes moth can eat 92 pounds of wool in a year.

Bleaching Methods for Cotton Fabrics

E. Bretcher, *Textile J. Australia* 25, 292-6, May 20, 1950.

The author first describes the customary process for bleaching cotton goods. He then discusses two bleaching methods which were very popular in Europe, and are based on different principles: the

Mohr bleach and the CE-ES bleach.

In the Mohr bleach, which is a combination bleaching process, all operations are carried out in the one kier in which the goods are packed in rope form and the various liquors are circulated through the goods under pressure. About 5-6000 lbs. of cotton material are packed into one vessel, after being desized and washed, and are treated with cold sodium hypochlorite. This is followed by a second bleach with peroxide at 85° C. No repacking takes place.

The CE-ES bleach is fundamentally different from the normal chlorine bleach. The normal bleach utilizes the oxidizing power of the sodium hypochlorite while the CE-ES process is primarily concerned with the chlorinating action of the bleach liquor. The proteins are chlorinated to chloramines which are not only easily dissolved in the following alkaline peroxide process, but also act upon this bleach liquor as an activator. Any preliminary kier boil is unnecessary, which is a great advantage when colored woven fabrics have to be bleached. All dyes used in these fabrics must naturally be fast to chlorine.

The author comments on continuous bleaching methods, as used in the U.S.A., and the use of fluorescent compounds to enhance the whiteness of the bleach.

Shrinkage in Wool Fabrics: Its Cause and Treatment

(The Wool Bureau, Inc.) *Canadian Textile J.* 67, 54-6, July 21, 1950.

One of the most important problems the wool manufacturer must consider is shrinkage, because it counts so much in the acceptability of his product. In this respect the manufacturer faces a dilemma: On the one hand he knows that the use of chemical agents to resist shrinking will tend to affect the very qualities of the wool he is bent on preserving. On the other hand his product must have the shrink-resistance the consumer wants in products to be laundered frequently.

Actually there are two causes of shrinkage:

(1) *Relaxation Shrinkage.* This is a natural return to the position held by the fiber before it was worked on in the mill.

(2) *Felting Shrinkage.* This is the type of shrinkage which takes place in washing, and unlike relaxation shrinkage which can be recovered by restretching, once felting shrinkage occurs it never can be removed.

Shrink-resistant treatments fall into two steps:

(1) Treatments to combat relaxation shrinkage. Steam shrinkage and "London shrinkage", used for this purpose, are described.

(2) Treatment to prevent felting shrinkage. Three methods are mentioned.

(a) Wet chlorination treatments (Harriset, Sanforlan, Schollerizing, etc.). These rely on alteration of the surface structure of the wool fiber.

(b) Resin treatments (Resloom, Lanaset). These add organic resin to the fiber, enabling it to resist felting.

(c) Latex treatments (Durlana, Koloc). These depend on the addition of synthetic lattices.

The Dimensional Stability and Shrink-Proofing of Cotton Materials

E. C. Pfeffer, Jr., *A.S.T.M. Bulletin,* July, 1950, p. 86-7.

The author discusses in this paper the subject "What happens when a woven cotton fabric shrinks?"

The shrinkage in laundering of cotton fabrics that have been subjected to the normal operations of finishing without attention to shrinkage control is due to what has been termed "relaxation shrinkage". This occurs in the first laundering, and appears to result from the tensions imposed on the fabrics during slashing and weaving. The warp yarns of a woven fabric generally lie in the fabric abnormally straight, with a lower than normal amount of crimp. Also there are the additional tensions imposed during the bleaching, finishing and other operations; and cotton fabrics which have been tenter dried may shrink in both warp and filling dimensions when laundered.

Swelling of the cotton fibers with water and soap solutions is also one of the primary factors in the shrinkage of cotton fabrics. The swollen yarns influence each other and produce crimp changes.

Unless compensation is made for this relaxation shrinkage which occurs in cotton fabrics (e.g., by compressive shrinking), garments made from such fabrics will not be dimensionally stable.

Experiments made by the author on a broadcloth shirting fabric indicate that cotton fabrics shrink almost entirely due to crimp changes, and not due to yarn shrinkage. The paper is illustrated by photomicrographs.

The Cause and Prevention of Printing Faults

"Technical Correspondent," *Textile Recorder* 68, 72-4, July, 1950.

The author has particular reference to the manufacture of handkerchiefs, scarves, tablecloths and dress-goods. The importance of careful inspection of the goods at various stages of production is emphasized, to detect faults before the fabrics are made up. In the preparation of handkerchief goods for roller printing, correct width and straight threads are most important. The rollers should have a highly burnished surface and be free from low places caused by excessive rubbing to remove scratches. If stored in a damp, cold atmosphere, they may develop a coating of verdigris, which will cause pittings.

In the production of white discharges in dyed goods a white scum is sometimes formed; this fault is known as "facing". It is avoided by preparing the goods in a weakly oxidizing solution.

Faults in screen printing handkerchief goods, due to "serrated hems", and troubles with rayons which are difficult to bring to width while keeping the warp threads straight, are among other matters discussed.

Resin Can Improve Good Fabrics

R. M. Fischer, *Papers A.A.T.T.* 5, 123-8, June, 1950.

The original concept of a certain type of finishing was to use foreign substances to fill low count fabrics so they could enter the quality field. Today's use of resins for textiles has a completely different purpose. We treat fabrics with resins now in an effort to eliminate any undesirable fiber characteristics and to add to the desirable qualities of performance. Thus, good fabrics may be made even better.

The colorless urea formaldehyde resins were among the very first to be successfully adapted for textile use—giving crease resistance to rayons. Used on filament rayons, and particularly on spun rayons, the urea formaldehyde resins have proved of great value. Thus, in the case of spuns and spun rayon mixed fabrics, proper treatment with resins can give crease resistance, shrinkage control, increased dyestuff wash fastness, fabric stabilization and increased wet tensile strength, as well as improved hand and drapability.

Development of a new type, the melamine formaldehyde resin, has considerably broadened the field of resin application. In addition to its use on rayons, the melamine resin, under the name of "Lanaset Resin", is used to control shrinkage of wool. Recent improvements in this application are described.

The author also discusses the use of thermoplastic resins to produce a durable soft, smooth finish with gloss, and different methods for testing the crease-resistance of fabrics.

Proceedings of the
American Association of Textile Chemists and Colorists

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OCTOBER 16, 1950

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29th ANNUAL CONVENTION ATTRACTS 1478

THE 29th Annual Convention, transplanted by the host Rhode Island Section from their own to the more accommodating New Hampshire coast, drew 1478 visitors, according to registration figures. An excellent program, combined with an ideal New England Fall setting, served to attract 1033 members, 133 nonmembers, 215 ladies, 32 students and 65 exhibitors.

The Wentworth-by-the-Sea, New Castle, N. H., site of the 1950 affair, served a dual role in handling the entire program as well as accommodating a large majority of registrants.

Under the general chairmanship of George H. Wood, the convention was regarded in most sources as an important success. Raymond W. Jacoby ably assisted Mr. Wood in his duties.

The Registration and Reception Committees, headed by Thorwald Larsen, Chairman, and Ira S. Hurd, Vice-Chairman, began a long and busy 3 days at 8 A.M. on Thursday, Sept. 28, in the Wentworth lobby. The job was smoothly and efficiently done with a minimum of delay. Ladies registration was handled separately at desks just opposite the main desk. The ladies had a complete and well planned program which was partly independent of and partly blended with the general program. Robert P. Wood and Arthur Bailey were Co-Chairmen of the latter program.

Major activity began with the National Council Meeting Thursday morning in the Hotel's Flamingo Room. The General Technical Program, with Dr. W. George Parks presiding, took place in the afternoon prior to the Annual Business Meeting under the direction of C. Norris Rabold. Concurrently, the ladies were entertained at a tea and cocktail party. The Corporate Member and Olney Medal Award Banquet was held in the evening in the main banquet hall with over 500 attending to honor George L. Royer, Calco Chemical Division of American Cyanamid Co. as the 1950 winner. Raymond W. Jacoby acted as toastmaster and paid tribute to two groups "who had made possible the advance and achievements of the organization." These were (1) the companies which gave freely of their materials, advice, services, personnel, equipment and funds, and (2) the members who gave their knowledge, ability and energy to make the work possible.

Mr. Jacoby introduced George O. Linberg, National Vice President, who discussed the interdependence and mutual benefits of the association and its corporate members; Kenneth H. Klipstein, who spoke on "The Medalist—The Man," and Dr. Milton Harris, former Olney Medal recipient, who spoke on "The Medalist—The Scientist." Mr. Rabold made the presentation of the Olney Medal after which Mr. Royer responded and spoke on "The Scientific Approach to the Study of the Coloring and Finishing of Textiles." His talk was supplemented with slides. Others seated at the head table were: Wilfred A. Lord, Banquet Chairman; Elliot Broadbent, Rhode Island Section Chairman; George H. Wood, General Convention Chairman; Harold C. Chapin, National Secretary; Charles A. Seibert, 1949 Olney Medal winner; William R. Moorhouse, National Treasurer; Arthur W. Etchells, National Vice-President; J. Robert Bonnar, Chairman of the General Research Committee; Dr. Harold W. Stiegler, Director of Research, and Francis H. Casey, Co-

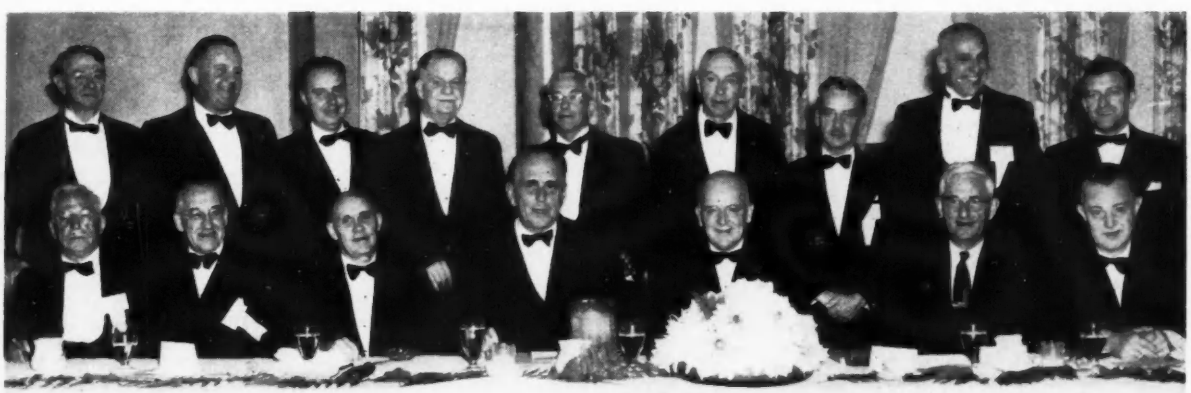
George L. Royer receives the Olney Medal from C. Norris Rabold

Chief figures of the Olney Medal Presentation (Standing—Kenneth H. Klipstein, left, and George L. Royer. Seated—C. Norris Rabold, left, and Dr. Milton Harris)

Seated at the Dais—Olney Award Dinner

Seated (l. to r.)—Wilfred A. Lord, Elliot Broadbent, George H. Wood, Harold C. Chapin, Charles A. Seibert, Kenneth H. Klipstein, and George O. Linberg

Standing (l. to r.)—William R. Moorhouse, Arthur W. Etchells, J. Robert Bonnar, Harold W. Steigler, Milton Harris, Rev. Shields, Francis H. Casey, C. Norris Rabold, Raymond W. Jacoby and George L. Royer



Seated at the Dais—Annual Banquet

Seated—William R. Moorhouse, George O. Linberg, George H. Wood, "Tex" O'Rourke, Elliot Broadbent, J. D. Smart, C. Norris Rabold

Standing—P. J. Wood, Henry Herrmann, J. Robert Bonnar, Raymond W. Jacoby, Harold C. Chapin, William D. Appel, Harold W. Stiegler, Carl Z. Draves and Frank J. O'Neil

Group Photograph of the National Council Meeting

Members of the Intersectional Contest Committee (Standing —Patrick J. Kennedy, Arthur W. Etchells, and Earle D. McLeod. Seated—Frank J. O'Neil, Thomas R. Smith)

George L. Royer makes a presentation to C. Norris Rabold to do a switch on the previous evening's action. George Wood and Elliot Broadbent look on.

Chairman, Banquet and Dining Committee.

Those ladies who did not attend the Olney Award Banquet had their own banquet at the Rockingham Hotel in Portsmouth, N. H.

Breakfast meetings of the Corporate Membership Committee and the Research Advisory Committee started the Friday activities. These were followed in the morning by the Cotton Group Meeting (at which Dr. Peter G. Kolupaev presided), the Wool Group Meeting (at which Eric O. Appeltofft presided) and the Ladies' Trips about the historical points of Portsmouth and through the Goodall-Sanford Sales Rooms.

The first of two clambakes, among the outstanding attractions of the convention, took place at noon on Friday; the second, at noon on Saturday. Comments on the generous portions of lobsters, clams, corn, etc., were extremely favorable.

The Intersectional Prize Paper Contest took place on Thursday afternoon. The evening saw a double performance of a variety show featuring several television acts.

Meetings of the Synthetics and the Auxiliaries and Testing Groups occupied Saturday morning to finish up the technical program. Frank A. Stubbings presided at the former and Earle D. McLeod at the latter.

Elliott Broadbent acted as toastmaster for the Convention windup—the Annual Banquet. Following Mr. Broadbent's opening remarks, J. D. Smart conveyed the greetings of Gov. Adams of New Hampshire. George H. Wood, General Chairman and P. J. Wood, Past President, were also called on to speak. Frank J. O'Neil,

The High Command of the 1950 Convention (L. to R.)—Elliot Broadbent, Raymond W. Jacoby, George H. Wood, C. Norris Rabold and W. George Parks

The Medalist entertains guests at "lunch."

Scene at the Noon Clambake

new Intersectional Contest Committee head announced the winners as follows:

First Prize—Piedmont Section, "A Comparison of the Dyeing Characteristics and Related Properties of Rain-Grown and Irrigated Cotton."

Second Prize—Rhode Island Section, "The Continuous Dyeing of Nylon Fabrics."

Third Prize—Philadelphia Section, "The Relating of Laboratory Exhaust Data to Mill Practice."

President C. Norris Rabold gave a stirring address just prior to the main speaker for the evening, Tex O'Rourke. Mr. O'Rourke replaced Harold G. Hoffman, originally slated as guest speaker, and proved extremely popular with the audience. With a background of semi-pro football player, soldier of fortune and part-time political "insurgent," Mr. O'Rourke's anecdotes and picturesque patter were highly refreshing.

Charles W. Dorn, New York Section Chairman, extended an invitation to all to attend the 1951 Convention to be held in the Hotel Statler, New York.

In addition to the speakers, those at the head table included Henry Herrmann, William D. Appel and Carl Z. Draves (Past Presidents), J. Robert Bonnar, Raymond W. Jacoby, William R. Moorhouse, George Linberg, George Wood, Harold Chapin and Harold W. Stiegler.

Following are the Convention Committee Chairmen and Co-Chairmen who served so well for the Rhode Island Section (in addition to those mentioned previously):

Entertainment—Earle K. Bush, Chairman. James R. Redmond, Co-Chairman.

Exhibits—Raymond A. Pingree, Chairman. George Gantz, Co-Chairman.

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Technical Program—W. George Parks, National Chairman. Alden D. Nute, Local Chairman.

Transportation—Herman C. Allen, Chairman. Kenneth J. Broden, Vice-Chairman.

Though an organized golf tournament failed to materialize, many of the members and guests took advantage of the nearby clubs, and especially the nine-hole course just across the bridge from the Wentworth. The chipping course in front of the hotel also proved very popular.

Other popular "extra curricular activities" included tennis, boating, fishing and the "Tally-ho."

Forty-seven organizations exhibited in the Hotel Annex. The exhibits were highly attractive and, though not as large in number as those at the 1949 Convention, the calibre was just as high. A great deal of interest was reported.

—♦ ♦—

Membership Applications

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Edward J. Feeley, II—Lab. Asst., E. J. Feeley Co., Boston, Mass. Sponsors: S. A. White, W. A. Stickney, Jr.

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Albert J. Hulsebosch—Field Engr., International Salt Co., Inc., Scranton, Pa.

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Joseph Metzger—Supt. of Finishing, Interstate Dyeing & Finishing Co., Passaic, N. J.

Jean Rottmann—Chemist, Manufacturera de Tejidos S. A., Lima, Peru.

Charles W. Strong—Vice President, Campbell-Fairbanks, Inc., New York, N. Y.

Robert G. Wellen, Jr.—Sales Technician, Estate of W. U. Farrington, East Greenwich, R. I.

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APPLICATION FOR TRANSFER TO SENIOR MEMBERSHIP:

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It is presumed that authors in studying the comments of reviewers and of the Editor will remember that all recommendations are made in a kindly, helpful, sympathetic manner to improve the paper in both literary and technical excellence. Although authors should cheerfully consider suggestions, they are expected to defend their position if justified, especially when strictly technical matters are involved with which the authors have an intimate knowledge.

MANUSCRIPTS—Manuscripts shall be typewritten double-spaced with approximately one-inch margins on 8.5 x 11-inch white paper. In addition to the original, at least two carbon copies are required. Pages are to be numbered consecutively with Arabic numerals, and each page after the first shall carry the authorship at the very top. Tables and figures shall also be numbered consecutively, the tables with headings containing Roman numerals as TABLE I, TABLE II, etc., and the figures with Arabic numerals as Figure 1, Figure 2, etc., appearing *below* the figures. The names of the authors and their laboratories or business connections should appear below the title of the paper.

Articles appearing in the *Proceedings* in recent issues of the *American Dyestuff Reporter* will be helpful to authors as models of form for the typing of manuscripts.

LITERARY STYLE AND FORM OF PRESENTATION—In the writing of papers, authors are requested to observe a trenchant, simple style of writing directed to textile chemists and colorists with at least an elementary knowledge of chemistry, physics, mathematics, engineering, textile processes and textile machinery.

In the organization of the material, there should be one or more introductory paragraphs setting forth the occasion, significance and main objectives of the paper and of the method of attack. This should be followed by the body of the presentation, either with discussions interspersed throughout this portion or with a collected section marked "DISCUSSION" after the main body of the paper. Finally, there shall be a brief section at the end entitled "SUMMARY" or "CONCLUSIONS." A separately written abstract of not over 200 words shall accompany every manuscript.

Center headings should be employed sparingly and generally will include only very important section headings, such as "INTRODUCTION," "EXPERIMENTAL," "DISCUSSION," "CONCLUSIONS," "SUMMARY" and "REFERENCES." Side headings (see third paragraph of this *Notice* for an example) shall be indented and run into the text to which they apply, and shall be separated from the paragraph by a dash. The publisher will print center headings in boldface capitals and side headings in capitals.

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Proceedings of the American Association of Textile Chemists and Colorists

ACCELERATED AGING OF FABRIC—EFFECTS OF ELIMINATION OF SUNSHINE ON WEATHER-EXPOSED FABRIC AND SUBSEQUENT DETERIORATION IN STORAGE*

JULIAN MAAS
Chemist of Development Division of Naval Clothing Depot, Brooklyn

Cotton sheeting was subjected to three forms of weather exposure:

(1) All influences, including solar radiation and rain.
(2) All influences, but with exclusion of sunshine and rain by a cover.
(3) All influences, but with exclusion of sunshine by a slat device.

After exposure for one-, two- and three-month periods of time, the fabric was placed in storage at constant temperature and relative humidity. One-half of the samples were neutralized before storing as a precaution that any change would not be due to extraneous influences while in storage.

Examination was made by established methods, with modifications, for cuprammonium fluidity, breaking strength and sulfuric acid equivalent upon withdrawal of the samples from exposure and after periods of four and eight months' storage.

The deleterious effect of solar radiation was noted and the suggestion offered that other factors, such as temperature changes and wind velocity, may be influences causing deterioration.

With all forms of exposure, there appeared to be a continued degradation when the fabric was in storage. This was evidenced by the fluidity and breaking strength measurements, and these values showed a definite correlation to each other. For the first four months in storage the deterioration appeared quite pronounced, and this continued during the eight-month periods with, however, a tapering off.

From a study of the relationship between acidity and deterioration, it was found that the degradation was greater with larger amounts of H_2SO_4 equivalent. The acidity gathered from the atmosphere decreased while the fabric was in storage and during the same time that the deterioration progressed.

It appeared upon examination immediately after withdrawal that the fabric under SLATS deteriorated less and there was a less acid condition than that under total COVER—which was contrary to what had been expected. However, in storage the reverse was the case, and, as a rule, the fabric which had been subjected to rain water under SLATS deteriorated more than that which had been under COVER.

Although the present study pertains only to the effects of weather exposure and storage at Brooklyn, it is probable that degradation in storage continues also at other locations. It is evident from results of this investigation that in the study of the effects of weather, tests should be made without delay after withdrawal of the fabric from exposure.

INTRODUCTION

DURING a previous investigation of the effect of outdoor exposure on cotton textiles *(10)*, a post-weathering degradation was accidentally discovered. The Naval Clothing Depot in connection with other agencies working on the same project† had been exposing bleached twill in Brooklyn, N. Y. and Clearfield, Utah. Fluidity and breaking-strength measurements were made on the exposed fabric, and, when these tests were repeated after a lapse of several months, a difference was observed in the measurements indicating that deterioration had taken place during the interim. Since, however, only a few samples were tested and the conditions were not sufficiently well known, a study of this apparent phenomenon seemed desirable.

The literature abounds with evidence of deterioration of cellulose from solar radiation. Abstracts of current publications are issued at intervals by the Prevention of Deterioration Center of the National Research Council *(14)*, and a comprehensive digest citing numerous references regarding the action of light on textile materials has been given by D. K. Appelby *(2)* of the Southern Regional Research Laboratory, New Orleans. That agency has used color filters to determine the effect of various portions of the spectrum, and is presently making an investigation of the effect of weather on strands of cotton. Work at the Naval Clothing Depot shows that, of all the factors of weathering, sunlight and intense atmospheric pollution[1] are the most potent in their effect. Identical fabric exposed at Brooklyn and at Clearfield exhibited much more degradation at the former location, and a study of the various factors of the weather at Brooklyn points definitely to the great influence of sunshine.

* Conducted in conjunction with Exploratory Committee on Aging of Cotton Textiles, an AATCC committee.

† Among the other active agencies were the Office of the Quartermaster General, Research and Development Branch, (Philadelphia Quartermaster Depot), Bureau of Standards, and Southern Regional Research Laboratory. A program was originally planned on a comprehensive scale under the heading "Accelerated Aging of Cotton" to learn, if possible, the effects of the variables of the weather and then attempt to simulate these effects by accelerated laboratory means. This extremely difficult problem has been simplified and the work currently carried on by the "Exploratory Committee on Aging of Textiles" of the American Association of Textile Chemists and Colorists.

[1] Pincus and Stern *(13)* estimated the amount of sulfur dioxide in the atmosphere of New York City in 1934 at 2,000 tons per day. Morris states *(12)*, it is estimated that 5% of coal goes into air as unburned carbon.

It appears to be well established that the ultraviolet portion of the spectrum is the most active in causing degradation. The result may be due to oxidation or hydrolysis or photochemical change; in any event it is explained by a breaking up of the molecular chain length. Theories have been advanced as to whether the chain is linear or branched, and with respect to the manner in which the linkage is broken and the degree of polymerization that exists after the breakdown. It is not within the scope of this paper to discuss the chemistry of the change, but rather the resultant condition as indicated by physical (breaking strength) and chemical (fluidity) measurements.

In view of the vast amount of work already performed and currently being carried on regarding the action of light, this factor was eliminated in the present investigation. Exposures were therefore made without sunshine and, for comparison, with sunshine in order to learn the following:

(a) The effect of the various factors at the time of exposure and immediately thereafter so as to detect the influence of the other variables, which in the absence of sunshine would be more apparent.

(b) The degradation, if any, after the fabric was removed and placed in storage. Search in the literature and questioning of informants failed to reveal any mention of an after-weathering deterioration. There does not appear to be evidence of a post-weathering change as distinct from a post-ultraviolet radiation effect *(15)*.

EXPERIMENTAL

TEST METHODS.—

(a) Fluidity

Cuprammonium fluidity determinations were made according to the method of Clibbens and Geake *(5)*, with modifications by Mease *(11)*, Conrad and Tripp *(6)*, and Battista *(3)*.

1. Summary of Preparation and Storage of Cuprammonium Hydroxide.

The generator for making the solvent was patterned after the one used by the Forest Products Laboratory, Madison, Wisconsin *(8)*. It consisted essentially of a copper cylinder containing closely packed copper wire and cooled with water at approximately 10°C. trickling down on the outside (Figure 1). The wire was covered with concentrated ammonia and ammonia-washed air bubbled through by means of a perforated ring of copper tubing in the bottom of the tank. In a couple of hours after starting, and subsequently at intervals of about fifteen minutes, samples were tested for copper content with a calibrated Coleman photoelectric colorimeter. When, after about three hours, the concentration of the copper became approximately 16 g. per liter, the air was turned off and the outlets clamped shut. Precaution was taken to avoid oxidation after the reaction was discontinued by adding 1 g. per liter of sugar and passing nitrogen through, instead of air, for about three minutes. When the preparation was finished, the liquid was allowed to stand for a few hours and then withdrawn, usually about four liters, into a large storage bottle, and the balance, about two liters, into a three-liter Ehrlenmeyer Pyrex flask for dilution and current use. Before the cuprammonium was diluted, it was analyzed for copper and ammonia by the usual volumetric and electrolytic methods. The ammonium hydroxide reagent was also analyzed for ammonia, and the calculated amount added to give the required content to the solvent, namely 15±0.1 g. copper per liter and 240±10. g. ammonia

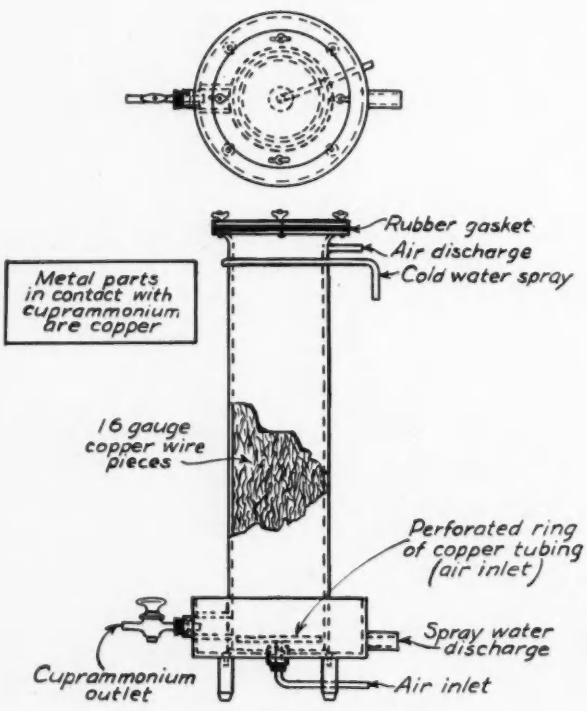

Figure 1

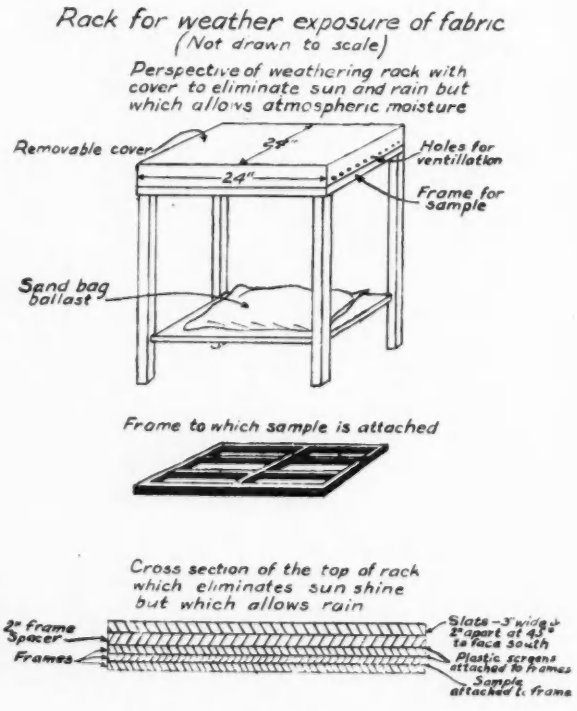
Rack for weather exposure of fabric
(Not drawn to scale)
Perspective of weathering rack with cover to eliminate sun and rain but which allows atmospheric moisture
Removable cover
2"
24"
Holes for ventillation
Frame for sample
Sand bag ballast
Frame to which sample is attached
Cross section of the top of rack which eliminates sun shine but which allows rain
2" frame Spacer
Frames
Slats - 3" wide & 2" apart at 45° to face South
Plastic screens attached to frames
Sample attached to frame

Figure 2

per liter.[2] A Lunge nitrometer was used to determine the nitrous acid equivalent, which, being less than 0.5 g. per liter, fell within the permissible maximum. As a safeguard against spoilage due to possible failure of the refrigerator, a small portion was stored in another refrigerator, both of them at a temperature of approximately 10°C.

2. Brief Outline of Procedure for Making Fluidity Measurements.

The sample to be tested was extracted with ethyl alcohol (to get rid of the waxy constituents), cut up with a scissors into fine shreds and conditioned at 70°F. and 65% R.H. in the textile conditioning room for not less than four hours. A Wiley mill with a #20 sieve was used for the large quantity of standard sheeting which served as a control.

An amount of the sample, calculated to give a concentration of 0.5% cellulose solution, was introduced into the dispersion tube by rolling it into the form of a cigarette with black, glazed, analytical weighing paper. The tubes were viscometers *(3)* having ground glass stopcock connections but with the three graduated rings eliminated. The solvent was run into the tubes by nitrogen from a Kipp-generator arrangement containing pyrogallol, the efficacy of which, as well as the purity of the nitrogen, was tested from time to time by means of a fog trap *(16)*.

Before placement of the sample in the tube, air in the capillary at the lower end was expelled by allowing the solvent to flow through the rubber tubing connected with this capillary, which was then closed with a pinch clamp. After the tube was filled and the excess solvent was allowed to escape through the stop-cock connection at the top, the sample was clamped to a bicycle wheel, protected from light, and turned end over end all night at a temperature of about 20°C. A copper pellet facilitated the dispersion of the cellulose and, being copper, combined with any available free oxygen in the tube.

The fluidity measurements were made at 20° ±0.1°C. in a water bath, which had a thermostatically controlled heating element and coils for cooling from an outside auxiliary constant-temperature bath of 19.5°C. Care was taken in this, as well as in other parts of the procedure, to avoid exposure to light. Ostwald viscometer pipettes (Fenske-Cannon modified) were used, with the bore of the capillaries chosen so that the efflux time of 5 cc. of the cellulose solution under test would be approximately 300 seconds. These pipettes were calibrated by determining the density (ρ) and efflux time (t) of 5 cc. of a liquid having a known fluidity (F) and substituting the values to obtain the constant (C) in the formula $C=F\rho t$. The calibration was checked by using two liquids obtained from the U. S. Bureau of Standards and chosen so as to have viscosities of approximately 22 cps. and 12 cps. (fluidities of 4.55 and 8.33, respectively). With the value of C known and the density of the cuprammonium solvent found to be 0.94, the above formula for fluidity of the sample becomes $F = \frac{C}{94t} = \frac{K}{t}$, where only the time of efflux of 5 cc. of the cuprammonium solution of the fabric need be determined. The measurements are given in terms of fluidity rather than the calculated degree of polymerization *(9)* or Basic DP *(3)*; and for the tolerance allowable in the present work, no correction for kinetic energy *(1)* and no adjustment to a velocity gradient *(6)* were made.

(b) Acidity

Since the textile industry in nearly all cases expresses acidity or alkalinity in terms of pH, it was thought desirable to determine and record the values in those terms. However, when the Backman pH meter was used, it was found that this method of expression was not sufficiently delicate. It was therefore more desirable to denote the acidity as sulfuric-acid equivalent, using as a basis of analysis the method of Coward and Wigley *(7)*. This, in brief, consists of digesting the ground-up sample in hot water for a few minutes and titrating with N/50 NaOH. Some difficulties were encountered with the weather exposed samples in that (a) there was a recurring end-point and (b) the soiled condition of the sample obscured the pink end-point. In order to overcome the former, a standard procedure was developed:—some of the precautions being to grind up the samples always the same way, heat at an incipient boil for exactly the same length of time and to immerse in cold water immeditely after reaching the pink color. The very soiled samples offered more of a problem but even though the end point was difficult to discern, results were obtained which were within the limits of allowable error.

(c) Breaking Strength

The raveled-strip method was used in the warp direction according to the ASTM procedure *(1)* with some modification. Instead of using a one-inch width, fifty threads making up approximately one inch across were taken. In this way, the same number of threads were broken before and after weather exposure.

EXPOSURE OF SAMPLES.—

1. Material

5½ oz. sheeting was used, furnished by Southern Regional Research Laboratory and kier-boiled by them. In addition to being a pure cotton fabric, it offered the possibility of making comparisons with exposures at New Orleans and Brooklyn, since identical sheeting was used at both locations for weather exposures.

2. Exposure Structures

Three kinds of exposures were made in order to subject the fabric to various conditions, which, for abbreviation, will be designated (a) COVER, (b) SLATS, and (c) SUN.

(a) COVER. Figure 2 shows the rack used for exposing the fabric with exclusion of sunlight and rain. The sample was mounted onto a framework, which permitted access of air on both sides. A wooden covering, which protected the sample from sun and rain, had holes in the side walls to further facilitate ventilation. Precautions, such as the use of noncorroding thumb tacks and acid-proof paint (white on the outside and black inside, to lessen the heat from the sun) were taken with this and other display structures to avoid extraneous influences.

(b) SLATS. In order to obtain the effect of rain water but still desiring to keep away sunshine, a second type of rack was built. In this form, the sample was again mounted on a frame similar to the one mentioned previously. Instead of a solid cover, however, a series of 20-gauge metal slats was used. These were 3″ wide, spaced 2″ apart, were inclined at angle of 45° from the horizontal and faced south. In order to disperse the water which would otherwise drip in lateral rows on the samples, two 16 mesh screens of plastic flyscreen material were used. These were placed one inch apart from each other and one inch above the sample, with the top screen separated by a two inch spacer from the bottom of the slats.

(c) SUN. As a control, as well as for comparison, a third series of exposures was made to have the effect of all the weathering influences, including sunshine. For this purpose, the samples were merely suspended on wood frame supports.

NEUTRALIZATION OF SAMPLES.—As a precautionary measure, the weather-

[2] This same content of copper and ammonia is used by U. S. Bureau of Standards and Philadelphia Quartermaster Depot and Milton Harris Associates. American Viscose Corporation *(3)* and A.S.T.M. *(1)* prescribe 200 g/l instead of 240 g/l for ammonia, while Southern Regional Research Laboratory uses 30 g/l and 165 g/l of copper and ammonia, respectively *(6)*.

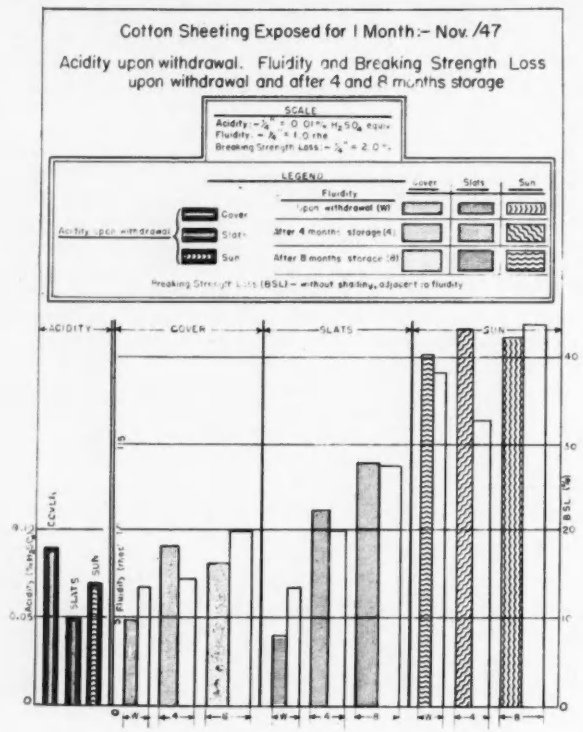

Figure 3a

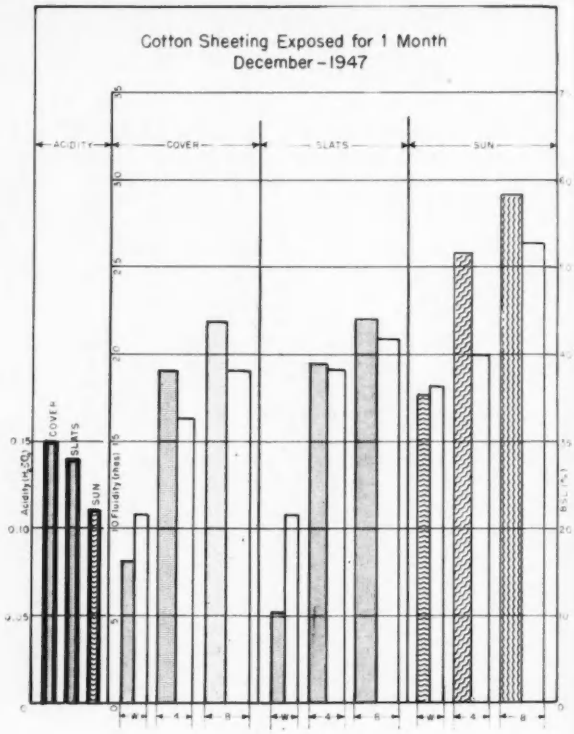

Figure 3b

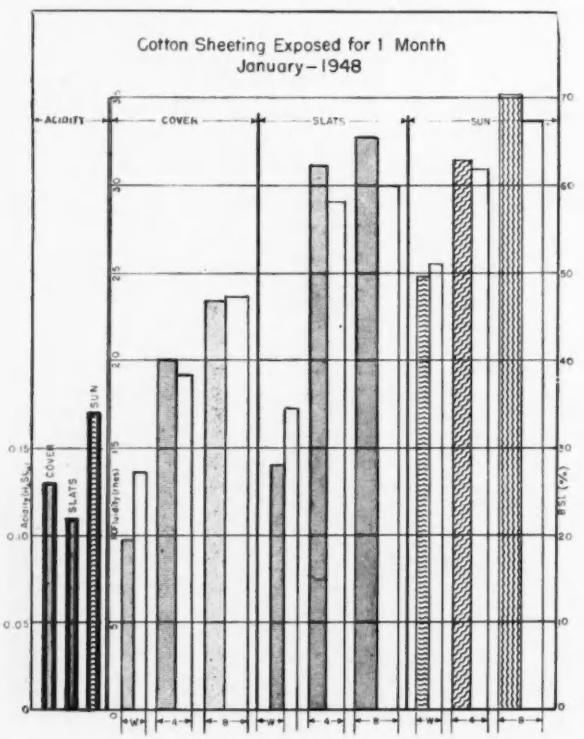

Figure 3c

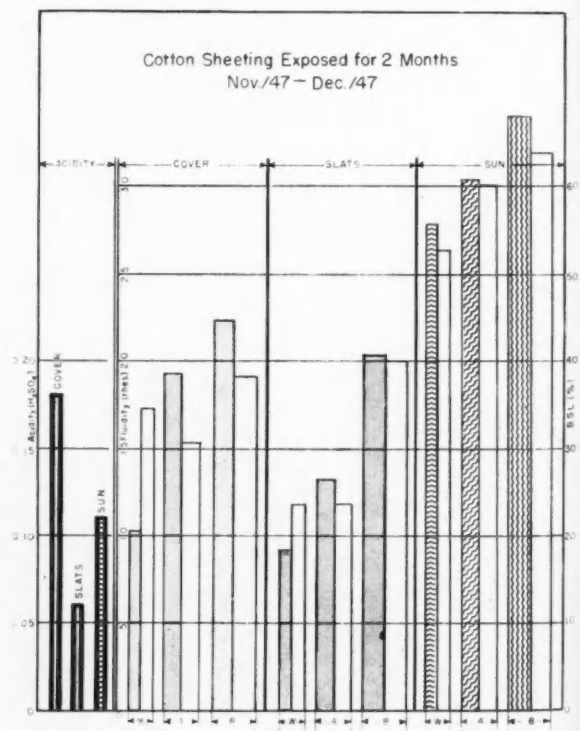

Figure 3d

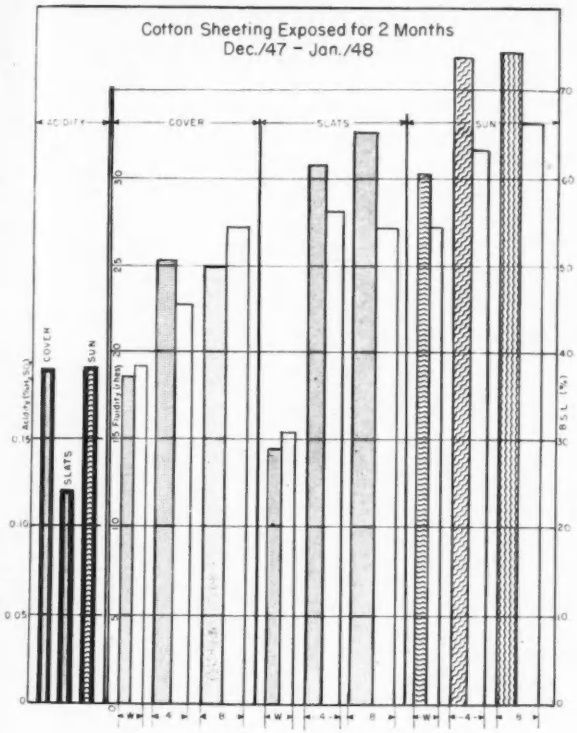

Figure 3e

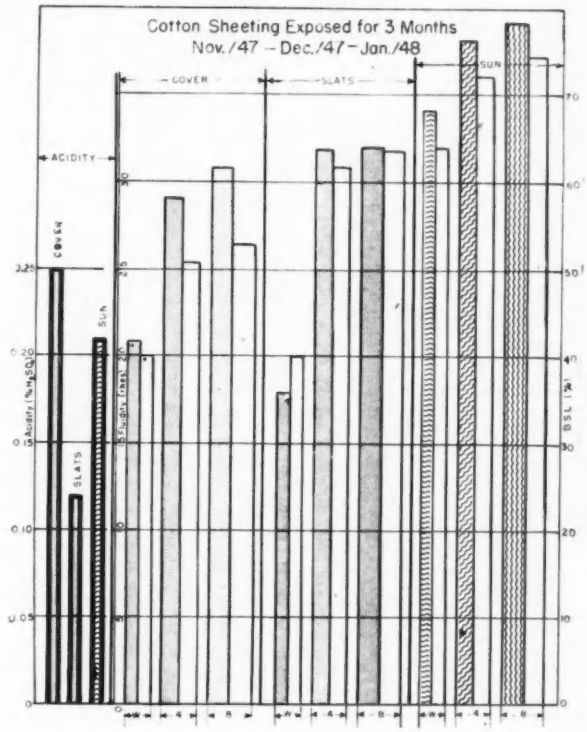

Figure 3f

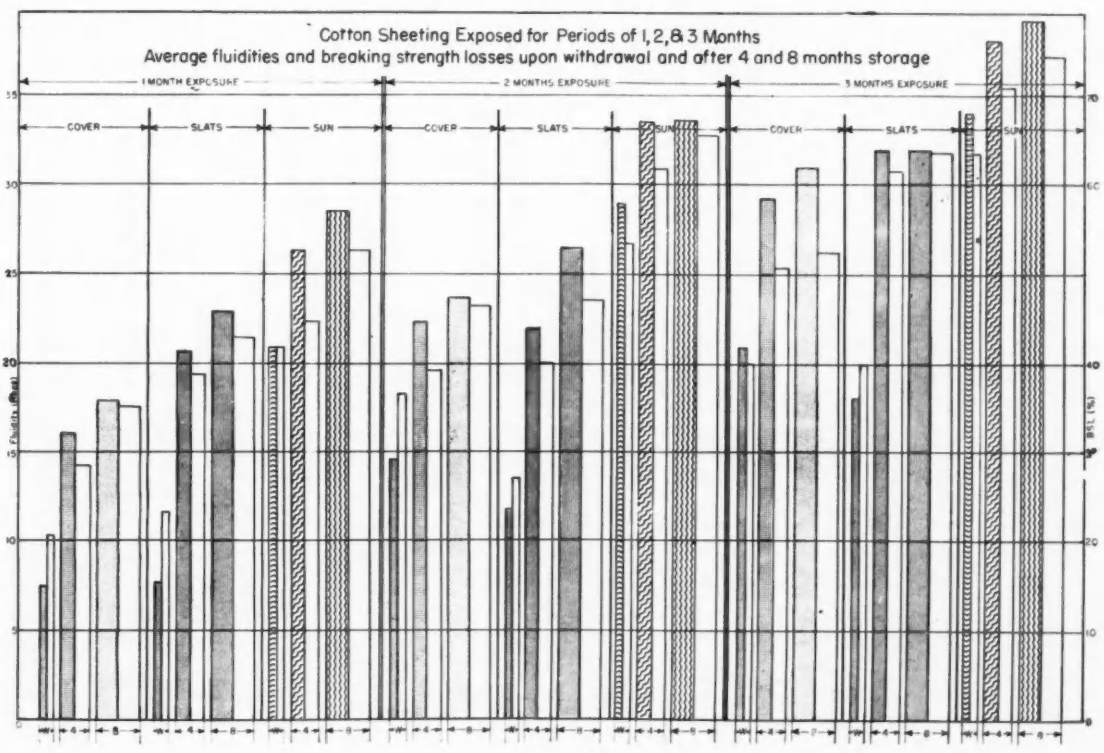
Cotton Sheeting Exposed for Periods of 1, 2, & 3 Months
Average fluidities and breaking strength losses upon withdrawal and after 4 and 8 months storage
1 MONTH EXPOSURE
2 MONTHS EXPOSURE
3 MONTHS EXPOSURE
COVER
SLATS
SUN
BSL (%)

Figure 3g

TABLE I

Weather Observations for Months of Exposure of Cotton Fabric

(Data from Meteorological Summary Published by New York Office, U. S. Weather Bureau)

	Nov./47	Dec./47	Jan./48
*Temperature cycles, (No. of changes of 10° F)	1	6	8
No. of 24-hr. periods with wind velocity exceeding 20 miles per hr.	24	29	22
Sunshine in 1000 minutes	8.8	11.0	9.5

Extreme precipitation in November: 6.5″ Trace of snow.

Extreme snowfall in December: 29″ (25.6″ on December 26).

* A change of 10° or more in 24 hrs. in the temperature readings taken at noon is designated as a cycle. Thus, the readings at noon on November 8 and 9 were 58.2 and 45.5 respectively, which constituted one cycle.

exposed fabric was placed in storage in two ways. Upon withdrawal from exposure, the sample was cut in half, one-half was stored just as it was taken from the roof and the other half neutralized. By making the periodic tests of the two halves at the same time, it was seen that, since there was no change in the neutralized portion, the deterioration of the untreated half must be due to causes other than those arising from storage. Some experimentation was made to find the minimum quantity of alkali that would render the sample completely neutral and not otherwise affect its condition. The method found to be most efficacious was to wash the sample in water at 140°F. for about 20 minutes in a laundering machine, to rinse thoroughly and then to allow it to stand for approximately two hours in 2% NH_4OH.

STORAGE OF SAMPLES.—The weather-exposed fabric was stored in the textile conditioning room at the Naval Clothing Depot, which had constant conditions of 70°F. temperature and 65% relative humidity. The samples were placed loosely in boxes away from the light and allowed to remain for the designated periods.

RESULTS

(a) Examination of Weather-Exposed Fabric Before Storage.

1. As mentioned in the Introduction, the damaging effect of sunshine on cellulosic material is already well known, and this fact is confirmed in the present experimentation. It may be seen from Figures 3a-3g that the fabric under SUN exposure deteriorated far more than that under COVER or under SLATS. There are definitely higher fluidities and breaking strength losses for SUN exposures for all periods of time.

2. The literature on cellulose degradation contains frequent references to the direct relationship between fluidity and breaking-strength loss due to hydrolysis, or chemical breakdown by acids. It may be assumed that the deleterious influence of the atmosphere at Brooklyn is largely due to acidity of industrial fumes, which contain the anhydride of sulfurous acid (sulfur dioxide) and to a less deleterious extent, the carbonic acid anhydride (carbon dioxide). The direct correlation between fluidity and breaking strength loss can be seen upon examination of the graphs.

3. A further observation, which might have been foretold, was the cumulative effect of the continued weathering. For all forms of exposure the samples showed increased fluidity and breaking-strength loss for additive one, two, and three months.

4. It was observed that there was an increase in deterioration for the successive months of November, December and January. For all forms of exposure, the fluidities and breaking-strength losses were greater for January than for either November or December, and were greater in December than they were in November, with one exception (SUN fluidity and breaking-strength loss for December were less than those of SUN for November). This increase in deterioration may have come about because there were more fires for heating as the winter months progressed, with a consequent increase in deleterious air pollution. A further contributing reason may have been the number of abrupt changes of temperature. If a change of 10°F. within 24 hours from the temperature at noon is considered a cycle, then there were seen to be one, six, and seven of these cycles in Novembr, December and January, respectively. (See Table 1).

5. In trying to attach some reason as to why with SUN exposure for the month of December there should be less deterioration than with November or January, we noted that during December there were 29 days in which the wind velocity was more than 20 miles per hour, whereas with November and January there were only 24 and 22 days, respectively. It is therefore possible that the wind in December may have carried away the contaminating impurities in the air. According to the well known phenomenon of degradation by ultraviolet radiation, it might be inferred that the comparatively small deterioration during December was due to a smaller amount of solar radiation for that month. However, there were actually more hours of sunshine than with the other months.

(b) Deterioration in Storage.

1. There was found to be deterioration in storage with all forms of exposure for the one-, two- and three-month periods, being very marked after four months and also, although not to such a great degree, after eight months. This was indicated in every case by the fluidity and in nearly every case by the breaking strength. Thus, the SLAT sample for December exposure showed 5.2 rhes upon withdrawal and 19.5 rhes after four months storage, an increase of 275%. During the next four months the fluidity increased to 22 rhes, while the breaking strength loss went from 21.8% to 38.2% and then to 41.8% for examinations at withdrawal and after four and eight months, respectively.

2. It is interesting to see that the increase in deterioration while in storage was less with fabric that had been exposed to the sun than with fabrics subjected to other kinds of exposure. It may be thought that this conflicted with the findings of Stillings and Van Nostrand *(15)* who showed an after ultraviolet-radiation effect. Other considerations must be taken into account, however, such as the acidity and the possibility that the rate of degradation slackens as the greater degree of deterioration is reached, etc.

3. Upon storage, the fluidity was found to increase, whereas the acidity decreased in respect to time.

4. It may be seen that the samples exposed under SLATS for all periods except the two-month November-December period deteriorated during the first four months of storage far more rapidly than those from under COVER. This was in accordance with what was expected, namely, that the acid-forming rain water would have more effect than the gaseous sulfur dioxide. It is puzzling, however, upon further examination of the bar graphs, to find a paradoxical situation when making comparisons upon withdrawal rather than after four months' storage. Here the COVER samples were

(Concluded on Page P714)

Report of Rhode Island Section Outing

Emory Richards of Florence Dye Works won the gold trophy for low gross score with a 77 at the Outing of the Rhode Island Section at the Wannamoisett Country Club, Rumford, June 16, 1950. Ralph Hawes of Apponaug Division of Aspinook Corporation, who twice has won the trophy, was runner-up with a 78.

A capacity crowd of 300 attended the Outing. Besides the golf tournament there was luncheon and a dinner. Elliot Broadbent, Chairman of the Rhode Island Section and in charge of weather arrangements for the Outing, was especially commended for the ideal day he secured.

James Redmond of Interchemical Corporation was Chairman of the Outing Committee. Aiding him were:

Golf—James Davies, Arnold Hoffman & Co.

Photography—Kenneth Everett, Powdrell & Alexander.

Donations and Tickets—Newton Graves, Franklin Process Co.

Parking and Reception—William Green, Sun Chemical Corp.

Printing—Robert Joerger, Franklin Process Co.

Publicity—John Roarke, Lincoln Bleachery, Lonsdale Co.

Dinner—Herbert Travis, Rohm & Haas Co.

Prizes—Fred Grant, Synthron, Inc., John Harley, Ciba Company, Charles Stokes, Carbic Color & Chemical Co.

Prize for low net in Class A was won by Frank Barrie of Universal Winding Company with a gross of 84 and net of 69. William Clarke of Arnold, Hoffman & Co., was second with gross of 80 and net of 70.

Prizes in Class B went to Art McLean, Glenlyon Print Works, for low gross of 83. Runner-up was William Connors, Sargent & Wilbur Company, with an 86. Low net went to Harold Dixon, Cook Yarn Dye Mills, with a gross of 90 and net of 68, and to Robert Easdon, Jr., of Perennial Division, Allied Textile Printers, Inc., with gross of 93 and net of 69.

R. I. SECTION OUTING PHOTOS

Top, left—Joe King, Consultant
Top, right—Jim Redmond, Interchemical

All photos by Kenneth C. Everett

Center—(L. to R.) Fred Grant, Synthron; Herb Travis, Rohm & Haas; Del Gifford, Sessions & Gifford

Bottom—(L. to R.) Art McLean, Glenlyon; Al Dixon, Cook Yarn; Bill Connors, Sargent & Wilbur Co.; Bob Easdon, Jr., Allied Printers

Top, left—Emory Richards, Florence Dye; Ralph Hawes, Apponaug; Bill Clark, Arnold Hoffman
Top, right—Emory Richards (Hey Mom, I Won Low Gross)
Center—George Wood, Apponaug; John Benedict, Hampden Chemical; Ed Maslanka, National Starch
Bottom, left—Charlie Hollenbach, Althouse
Bottom, right—Leon Therrien, Nova Chemical

In Class C, low gross went to Alden Nute, American Cyanamid Co., with 92, and Robert Beven, Heyden Chemical Corporation, with 95. Low net was won by Chet Stevens, Lincoln Bleachery, Lonsdale Co., with 105-65 and James Falcon, Heyden Chemical Corp. with 100-70.

A special prize for the most 5's went to Ken Lydic, Owens-Corning Fiberglas Co., for 11; for the most 6's to Larry Rossiter of Nopco Chemical Co. for 13, and for the most 7's to George Wood of Apponaug Division of Aspinook Corporation for 8.

The putting contest was won by Jeff Carlson, Lincoln Bleachery, Lonsdale Co., with a 34. Runnerup was Everett Law of Bradford Dyeing Association with a 35.

Herb Travis of Rohm & Haas Co., won the driving contest with a long one measured at 399 yards, tying last year's record. Prize for nearest to the pin on the third hole was won by Homer Rockleau of General Mills with one measured (quite some time after the dinner got underway) at 1/64 of an inch.

Golfers on 3rd Green and 4th Tee

Golf Scores

CLASS A

Gearge McElroy	Owens-Corning	83-13- 70
Webb Rooke	U. S. Oil Company	82-12- 70
Ray Andrew	U. S. Oil Company	94-15- 79
Jeff Carlson	Lincoln Bleachery	82- 9- 73
Ralph Carlson	Lincoln Bleachery	85-12- 73
George Montgomery	Arkansas Company	81-10- 71
Stan Freeman	Mill Street Laundry	84-11- 73
William T. Clarke	Arnold Hoffman	80-10- 70
George Curry	Bradford Dyeing Assoc.	96-10- 86
David Meikle	Stillwater Worsted Mills	79- 6- 73
Arthur Veevers	American Thread	93-13- 80
Ed Allard	National Aniline	97-13- 84
Ed K. Hayslip	Guyan Mills	82-10- 72
Herbert S. Travis	Rohm & Haas Company	80- 8- 72
James R. Redmond	Interchemical	89-14- 75
Tom Larson	Carbic Color & Chemical	81- 5- 76
Ralph Hawes	Apponaug Company	78- 6- 72
Dexter Earle	U. S. Oil Company	88- 6- 82
Everett Law	Bradford Dyeing Assoc.	90- 8- 82
Emery Richards	Providence Dye Works	77-14- 63
John McDermott	Dempsey Company	87-13- 74
Thomas Wright	Bradford Dyeing Assoc.	94-10- 84
Ralph Wilson	Cook Yarn Co.	90-15- 75
Alfred Harrison	A. Harrison Co.	83-12- 71
Del Gifford	Scssions-Gifford	86-15- 71
Robert Mulligan	J. W. Starkweather Co.	83-10- 73

(All photos by Kenneth C. Everett)

Below—(Standing, l. to r.) Fred Grant, Synthron; Bob Joerger, Franklin Process; Jim Redmond, Interchemical; Herb Travis, Rohm & Haas. (Seated, l. to r.) John Harley, Ciba; Newt Graves, Franklin Process; George Wood, Apponaug

THE OUTING COMMITTEE

(above)

Seated (l. to r.)—Newt Graves, Franklin Process; Bob Joerger, Franklin Process; Elliot Broadbent, Glenlyon (R. I. Section Chairman); Jim Redmond, Interchemical (Outing Chairman); George Wood, Apponaug

Standing (l. to r.)—Bill Green, Sun Chemical; John Roarke, Lincoln Bleachery; Charlie Stokes, Carbic Col. & Chem.; Jim Davies, Arnold Hoffman; Fred Grant, Synthron; John Harley, Ciba; Herb Travis, Rohm & Haas; Ken Everett, Powdrell & Alexander

Botton (l. to r.)—Paul Tapis, Tamay Chemical Products; Bernie Rivers, Lippert Worsted; Gerry Tenguay, Tamay Chemical Products; Leon Therrien, Nova Chemical Corp.

B. B. Fernald	Esmond Chemical Co.	89-10- 79
Alden Nute	American Cyanamid	92-26- 66

Del Gifford	Sessions-Gifford	86-15- 71
Robert Mulligan	J. W. Starkweather Co.	83-10- 73

Carbic Col. & Chem.; Jim Davies, Arnold Hoffman; Fred Grant, Synthron; John Harley, Ciba; Herb Travis, Rohm & Haas; Ken Everett, Powdrell & Alexander

Botton (l. to r.)—Paul Tapis, Tamay Chemical Products; Bernie Rivers, Lippert Worsted; Gerry Tenguay, Tamay Chemical Products; Leon Therrien, Nova Chemical Corp.

B. B. Fernald	Esmond Chemical Co.	89-10- 79
A. J. Gondyke	Providence	88-11- 77
Richmond Harrison	Borden & Remington	94-12- 82
Frank P. Barrie	Universal Winding	84-15- 69
Edward A. Peck	American Aniline	84-10- 74

CLASS B

Kenneth Lydic	Owens-Corning	93-25- 68
Alfred Lombard	Geigy Company	97-24- 73
Ted Wilke	Stein, Hall	100-20- 80
Irving Lakey	Jacques Wolf	93-20- 73
Donald Eccleston	Sun Chemical Corp.	91-18- 73
Arthur McLean	Glenlyon Print Works	83-18- 65
William Green	Sun Chemical Corp.	106-23- 83
Leonard D. Tubbs	Arnold Hoffman	91-19- 72
Robert Wood	Calco Chemical	92-16- 76
George A. Slade	Borden & Remington	99-22- 77
Richard Lewis	Prov. Dyeing, Bleaching Co.	95-25- 70
Andrew MacKenzie	Stillwater Worsted	108-22- 86
Dwight Allen	Davis Screen Mills	90-20- 70
Rochdian Homer	Guerin Mills	101-20- 81
Matthew J. Quigley	Interchemical	109-24- 85
Robert Easdon, Jr.	Perennial	93-24- 69
Ernest Chornyei	Bradford Dyeing Assoc.	109-24- 85
James Worton	Geigy Company	98-24- 74
William Turner	American Textile	98-20- 78
S. A. Straw	American Textile	95-22- 73
George Wilson	G. E. Wilson Co.	96-20- 76
William Connors	Sargeant & Wilbur	86-20- 66
William Eastburn	Matthewson Chemical	97-20- 77
Allard Dixon	Cook Yarn	90-22- 68
Ed Plummer	Cook Yarn	96-21- 75
Lionel Roberts	Valley Lace Company	102-22-80
Everett Aspinwall	Joy Chemical Company	106-25- 81
Charles Sumner Tanner	Charles S., Tanner Co.	96-23- 73
Karl Inderferth	Universal Winding Co.	95-16- 79
Fred Phil	Russell Mfg. Co.	98-18- 80
Glen Newman	DuPont	101-24- 77
Charles Stokes	Carbic Color & Chemical	99-24- 75
Ben Meady	General Dyestuff	115-25-90
Fred Grant	Synthron, Inc.	97-25- 73

CLASS C

Roland Gagnon	Owens-Corning	130-32- 98
James O'Flanavan	Owens-Corning	121-26- 95
George Wood	Apponaug	123-35- 88
Elliot Broadbent	Glenlyon Print Works	105-35- 70
Robert Farwell	DuPont	101-26- 75
Alden Nute	American Cyanamid	92-26- 66
Ray Farrell	Stein, Hall	115-30- 85
Frank Cutter	Heyden Chemical	101-26- 75
George Klingberg	American Velvet	112-30- 82
Charles Wood	American Velvet	106-22- 84
Jesse Fraser	Stein, Hall	105-30- 75
Leonard Costello	Stein, Hall	109-30- 79
Norman Nuttall	Stein, Hall	139-30-109
Ralph Miller	Corn Products	102-30- 72
Douglas Martland	Cranston Print Works	98-26- 72
William Small	Calco Chemical	106-30- 76
Victor Snowden	Prov. Dye., Bleaching Co.	118-36- 82
Earle K. Johnson	Branklin Process Co.	100-27- 73
Harry F. Sherman	Prov. Dye., Bleaching Co.	120-35- 85
James Murray	Prov. Dye., Bleaching Co.	110-30- 80
Louis Vavala	Prov. Dye., Bleaching Co.	119-35- 84
Sidney Sladen	Prov. Dye., Bleaching Co.	147-40-107
Raymond Mitchell	Sandoz	102-27- 75
J. L. Anderson	Franklin Process	104-28- 76
Robert Easdon, Sr.	Cranston Print Works	105-32- 73
Walker C. McBeath	Sandoz	101-30- 71
John A. Harley	Ciba Company	97-26- 71
Richard M. England	Monsanto	117-30- 87
Kenneth G. Dustin	Arnold Hoffman Co.	109-30- 79
John H. Coogan, Jr.	Arnold Hoffman Co.	122-35- 87
Allen Christie	Bryant Chemical	114-26- 88
Larry Rossiter	National Oil	104-26- 78
Russell Broadhurst	Russell Mfg. Co.	117-30- 87
Thomas Goulet	Maplewood Yarn Mills	110-30- 80
Walter Pride	Atlantic Rayon	130-30-100
Richard Stephens	DuPont	111-28- 83
Kempton Harrison	Borden & Remington	113-30- 83
Thomas Bourne	Borden & Remington	122-30- 92
Albert Viola	Providence Chemical	113-26- 87
Joseph Dube	DeMarr Company	143-30-113
Theodore Clarke	DuPont	104-27- 77
Aaron Winograd	Goulston Company	132-40- 92
George A. Goulston	Goulston Company	117-40- 77
Robert Ackley	Goulston Company	156-40-116
Ralph Turner	Heyden Company	140-40-100
Robert Beaven	Heyden Comuany	95-30- 65
Irving Loxley	Heyden Comuany	119-40- 79
Boyce L. Rhodes	Synthron, Inc.	119-40- 79
Al Flobeck	Sessions-Gifford Co.	125-40- 85
George Gantz	Lincoln Bleachery	106-26- 80
C. U. Stevens	Lincoln Bleachery	105-40- 65
James Shore	Atlantic Chemical	105-27- 78
Bernie Buonanno	Atlantic Chemical	107-27- 80
James Falcon	Heyden Chemical	100-30- 70
Howard Broadfoot	Aspinook	106-26- 80

Top—Chet Stevens, Lincoln Bleachery; Bob Beven, Heyden Chemical; Jim Falcon, Heyden Chemical; Alden Nute, American Cyanamid

Center—Harold Wood, Arnold Hoffman (left) and Bob Joeger, Franklin Process

Bottom—Al Lombard, Geigy (left) and Bob Joeger, Franklin Process

Top—Wannamoisett Clubhouse

Center—Herb Travers, Arthur Veevers and a group of golfers

Bottom, left—Golfers on 18th Fairway

Bottom, right—Jim Redmond, Interchemical; Bob Easdon, Sr., Cranston Print; Bob Easdon, Jr., Allied Printers; Matt Quigley, Interchemical

Piedmont Annual Meeting to be held in Charlotte, Oct. 28

THE Annual Meeting of the Piedmont Section will be held at the Hotel Charlotte, Charlotte, N. C., on October 28, 1950.

The technical session will convene on Saturday afternoon at 3:00 P.M. at which time Lawson W. Turner, Jr. of N & W Industries, Lynchburg, Virginia will speak on "Piece Goods from the Cutter's Viewpoint". This will be followed by a paper on "Dyeing of Algosols on Hosiery" to be presented by Karl A. Bridges of General Dyestuff Corporation, Charlotte, N. C.

The banquet will be served at 7:00 P.M. in the ballroom. The speaker of the evening will be Robert C. Jackson, Executive Vice President of the American Cotton Institute. His subject will be announced later. Mr. Jackson will be introduced by T. C. Whitsel, Chairman of the Technical Advisory Committee of the Southern Garments Manufacturing Association.

Charles C. Cayce of General Dyestuff Corporation, Charlotte, N. C. is in charge of meeting arrangements.

Report of Pacific Northwest Section Outing

THE first Annual Outing of the Pacific Northwest Section was held at Top O' Scott Golf and Country Club, Portland, Oregon on August 19, 1950. H. W. Beck, National Aniline Division, was chairman of the outing committee.

Golf winners were: Bob Pickens, Portland Woolen Mills and Eddie Stephen, Paris Woolen Mills, tied for *low gross;* Herb Beck, National Aniline Division, *long drive;* Chuck Bishop, Washougal Woolen Mills, *blind bogey;* Bob Pickens, *closest to pin No. 8;* Keith White, Washougal Woolen Mills, *high gross.*

Dinner was served at the Club House following the golf tournament. The incomparable Oregon weather added greatly to the occasion.

Respectfully submitted,

R. M. TRUE, *Secretary.*

*AATCC Sub-Committee**

LITERATURE SURVEY OF TEXTILE BLEACHING

JOHN F. HAGEN
Chairman

PART I

CONTINUOUS AND SEMICONTINUOUS BLEACHING—HYPOCHLORITE VERSUS PEROXIDE

CONTINUOUS AND SEMICONTINUOUS BLEACHING

(Continued from October 2 Issue)

PEROXIDE BLEACHING

1. Bleaching of Fabrics Having Color-Effact Fibers. M. J. Mouton. *Teintex* **13**, 120 (1948). Peroxide-persulfate bath solns. are used. Several bath compns. are discussed. Saverio Zuffanti.

2. Peroxide Bleaching. V. W. Slayter and K. W. Richmond. *Textile J. Australia* **23**, 96, 100-2, 112, 114 (1948). A survey of modern practice for major textiles, use of stabilizers, and new techniques.

3. Bleaching Organic Material Such As Cotton, Jute, Wool, Flour and Artificial Resins. Ehrhart Franz. *Chem. Abstracts*—1947. U. S. 2,077,103 Apr. 13. Accelerators free of heavy metal are applied to the material to be bleached, and aq. solns. of up to 3% H_2O_2 rendered stable by the addn. of stabilizers free from heavy metal, such as oxalic acid or H_2PO_4, are applied, so that the accelerators locally activate the bleaching. Various examples with details are given.

4. Peroxide Bleaching. V. W. Slater and K. W. Richmond (B. Laporte, Ltd., Luton, Bedford, Eng.) *Dyer* **98**, 658-62 (1947). A review of activators and stabilizers for H_2O_2 and the H_2O_2-bleaching of fur, wool, cotton, linen, rayon and straw.

5. Pilot Plant Bleaching of Cotton Fabrics. James H. Kettering and W. Norbert Berard (Southern Regional Res. Labs. New Orleans, La.) *Am. Dyestuff Reptr.* **30**, 552-4 (1947). A bleaching process consisting of R Hozyme desizing and alkali boil in a kier followed by soap scouring and H_2O_2 bleaching on a dye which produced a whiteness of 0.809 (MgO = 1.000) as compared with the av. of 0.809 for 4 com. processes. The tests for fiber damage showed no significant difference. 11 references.

6. Cotton Prebleaching Agent. Donald J. Campbell (to E. I. du Pont de Nemours & Co.) U. S. 2,426,142. Aug. 19, 1947. In the scouring operation preliminary to peroxide bleaching, treatment of a fabric with a peracid instead of H_2O_2 improves its absorbency and whiteness. The cloth is dipped into a soln. of from 5-20% of either persulfuric, peracetic, mono-perbenzoic, monoperphthalic, or monopersuccinic acid for periods of from 15 min. to 20 hrs. and is allowed to pick up about an equal wt. of the peracid soln. Cf. *Chem. Abstracts* **36**, 27369.

7. Determination of Residual Silica on Cotton in Peroxide Bleaching. Bertha DuBoise and V. B. Holland (Cannon Mills Co., Kannapolis, N. C.). *Am. Dyestuff Reptr.* **36**, 227-8 (1947). The SiO_2 content of cotton cloth, bleached in a bath contg. 1.16% 42° Bé silicate soln. ($Na_2O.3.2\text{-}SiO_2$) 0.99% 130 vols. H_2O_2, and 0.135% NaOH and then rinsed, increased from 0.32 to 2.20-2.38 mg/g. cloth. Treatmeat for 3 hrs. at 100° in solns. of silicate only followed by thorough rinsing gave a max. SiO_2 content of 0.88 mg/g. at 0.4% silicate. Addns. of alkali to 0.5% silicate solns. in increments 0.1% from 0 to 0.5% gave SiO_2 contents of: for NaOH 0.70, 1.79, 1.46, 1.47, 1.44, 1.41; for Na_2CO_3 0.70, 1.31, 1.25, 1.40, 1.35, 1.24; and for $Na_4P_2O_7$ 0.70, 0.57, 0.35, 0.34, 0.27, 0.36. 5 references.

8. Oxygen Balance in Hydrogen Peroxide Bleaching. S. A. Simon and Arthur Drelich (Chicopee Manuf. Corp., Chicopee, Mass.) *Textile Research J.* **16**, 609-15 (1946). A method is given of detg. the 0 balance, and the type of data secured from a typical bleaching soln. of H_2O_2 is illustrated. The method is generally applicable, but the data and interpretations apply specifically to the cottons, soln., and ratios of soln. to cotton described. Data show decompn. of peroxide, evolution of O, and consumption of O as functions of time. Oxygen balance is suggested as a parameter for evaluating bleaching systems. Oxygen-balance data in conjunction with data obtainable by other known tests can provide an insight into bleaching otherwise not obtainable.

9. Bleaching Practices in Germany. P. Larose (Natl. Research Council, Ottawa, Can.). *Can Textile J.* **63**, No. 10, 44-5 (1946). Report of a survey. Tables give data on peroxide bleaching, combined Cl and peroxide bleaches, and Cl bleaching for cotton, rayon, and their mixts.

10. Bleaching Textiles With Peroxides. Russell Mills (E. I. du Pont de Nemours & Co., Wilmington, Del.). *Am. Dyestuff Reptr.* **35**, 388-9, 393 (1946). Peroxide bleaching is an oxidation process whereby the coloring matter is either destroyed or made water sol. Wool is bleached after scouring in a bath contg. 0.25 to 2.5 vols. H_2O_2 at pH values 3.5 to 5.5. Fe, Cu, or brass should not come in contact with H_2O_2, but Pb and stainless steel are satisfactory. Cotton yarn is bleached more extensively. Cotton yarn is bleached in package machines. From 0.5 to 2% of a wetting agent are used as well as

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* AATCC Subcommittee, which conducted survey, consisted of W. R. Adams, T. E. Bell, R. L. Carr, R. S. Cox, A. D. Damon, H. O. Kaufmann, P. B. Reuman, R. A. Secord, F. R. Tripp, A. R. Wachter and John F. Hagen, *Chairman*, who prepared this final report.

2% soda ash and a 4% Na silicate. The temp. is brought to 120°F., then 4.6% of 100 vol. H_2O_2 is added and the temp. is raised to 180°F. at which temp. the bath is held for 2 to 4 hrs. Tubular knit goods are bleached in the kier using a wetting agent and H_2O_2 at 180°F. for 5-6 hrs. A continuous bleaching process for cottonpiece goods is coming into use. The 1st stage consists of an alk. pretreatment while the 2nd stage is the bleaching process proper using H_2O_2 in presence of Na silicate which stabilizes the bleach. Also in *Fibre and Fabric* 99, No. 3214, 6-8 (1946).

11. Bleaching of Cellulosic Goods Partly Dyed With Naphthol Dyes. R. L. McEwen (BECCO) U. S. 2,366,740, Jan. 9, 1945. Cellulosic textile goods, part of which are dyed with naphthol dyes, are first steeped in a 90% padding soln. prepared, e.g., from Na silicate 42° Bé) 25, NaOH 6 and H_2O_2 (100 Vil.) 18 lb. The goods are allowed to stand overnight and are then washed with hot and cold H_2O. They are subsequently dampened, e.g., by spraying, with the bleaching soln., which contains as bleaching ingredient H_2O_2 or other peroxide. A sample bleaching soln. is made of glacial AcOH 0.35, $Na_4P_2O_7$ 3.8, H_2O_2 (100 Vol.) 18 lbs. and sufficient H_2O to produce 100 gal. soln. The initial pH is preferably 9.0 and the final 7.1. The impregnation is obtained by passing the goods through the soln. into a steam jay chute of the Becco type and superheated steam is admitted to the goods, with the temp. maintained at 214°F. The excess soln. is removed from the fabric until no more soln. is left than about 70% based on the wt. of the dry fabric. The goods are finished in the conventional manner. Thus treated, no bleeding of the nayphthol dyes is produced, due to the fact that the wt. of the solution in the goods is less than 90% and no steam is condensed on the surface to permit the transfer of the dye.

12. Bleaching With Oxygen. Hans O. Kauffmann and Paul H. Margulies (to Buffalo Electro-Chemical Co., Inc.). U. S. 2,391,710, Dec. 25, 1945. Colorless portions of cellulose, regenerated cellulose, and rayons, striped with nophthol or related dyes normally not fast to O, may be bleached by H_2O_2, or by peroxides of alk. or alk. earth metals at 80-100° if the pH is kept at 7-9 with Na_2SiO_3, and if a "metal-Conditioning agent", as epsom salts, is present. No dye is liberated during bleaching under these conditions.

13. Simultaneous Scouring, Desizing, and Bleaching of Rayon Fabrics. Archie L. Dubeau, James D. MacMahon, and George P. Vincent (to The Mathieson Alkali Works). U. S. 2,373,881, Apr. 17, 1945. Unfinished fabrics of rayon (or contg. a large proportion of rayon) attain a brightness value of 74-6, as measured by a G.E. reflectometer, have a good absorbency, a soft hand, and a low starch content, without injury to tensile strength, when treated in any suitable appl., such as a Rodney-Hunt Kettle, with a soln. kept at an alky. below pH 11-12, by means of a buffer such as 5-10 g. per l. of Na silicate, and contg. 1-6 g. per l. of 100 vol. H_2O_2, and a synthetic detergent of the higher org. sulfate type, such as Na lauryl sulfate or Na oleyl sulfate in concn. of 0.5-1.0 g. per l.

14. New Developments in the Field of Peroxide Bleaches. Emil Scheller. *Melliand Textilber.* 25, 234-6 (1944). The attack on fibers at pH 7 can be traced to the action of elementary O formed by the decompn. of the bath owing to insufficient stabilization. Tables give data on the stability of 0.16% soln. at H_2O_2 at 82° in the absence of Mg silicate stabilizer as well as in the presence of 50 mg. Mg/l. As Mg silicate at pH 7.1, 8.0, 9.2 and 10.4. The stabilization action of Mg silicate reaches a max. at pH 7. Stabilizers are effective by removing traces of catalysts by pptn. Pos. catlysts can be rendered harmless by (1) converting them chemically into another, less active compds., (2) surrounding them by adsorption with a colloidal layer which is less porous to the bleaching liquor, and (3) poisoning the pos. catalyts with HCN, H_2S, certain org. compds., etc. Measurements of the n of bleaching soln. led to the following views regarding the role of elementary O in peroxide bleaches: (1) in the complete absence of atm. O dil. soln. of alkali cause no degradation of cellulose under pressure and elevated temps. (2) Intimate contact with air causes at an alky. of 0.02% NaOH (corresponding to 0.005 N NaOH soln.) a very definite degradation of cellulose. (3) Under conditions which prevent extensive formation of elementary O by the decomps. of the bleaching bath as well as the admittance of atm. O, it is possible to carry through a peroxide bleach without noticeable cellulose degradation. These views lead to the conclusion that H_2O_2 in an alk. medium does not attack cellulose and that any decompn. of the latter is due to the action of elementary O. In the system cellulose H_2O_2 —catalyst the degradation of the fiber is attributed to the formation of mol. O, which must be responsible for the fiber damage.

15. Hydrogen Peroxide as Antichlor. Bruno Walther. *Wascherei-Ber. 10, 67-71* (1942); *Chem. Zentr.* 1943, I, 1013-14; cf. *Chem. Abstracts* 37, 5251[4]. Instead of $Na_2S_2O_3$ to counteract excess Cl after bleaching, it is proposed to use H_2O_2, which does not affect the Cu washing drum and is more economical. Furthermore the H_2O_2 has the advantage that on decompn. of Cl lye, which often occurs, there remains a large excess of H_2O_2 after the antichlor action, and this acts as an after-bleach. Expts. with cotton and linen indicate that the fabrics are least affected by bleaching if H_2O_2 is used as antichlor.

16. Ce-Es Process For Bleaching Goods Containing Cotton and Mixtures of Cotton and "Zellwolle"; Principles and Practical Operation. G. Deuschle, W. Kling, and J. Simon, *Textilber.* 24, 21-6 (1943). This method involves the following sequence: (1) Wetting out; (2) alkaline chlorination; (3) controlled bleaching with H_2O_2; washing. Advantages claimed as compared with the classical methods are a lower loss in wt. on bleaching more selective removal of substances (especially proteins) responsible for low colors, and preservation of the morphological structural elements of which the fiber is built. Layouts for bleaching in the web and piece are described. This is the method of Ger. Pat. 653,989. *British Chem. Abstracts* 1945, B II, 140.

17. Peroxide Bleaching of Fibers. Chemische Fabrik Grunau A.G. Ger. 737,552, June 10, 1943 (Cl. 8*i* 1). In the presence of proteins, their degradation products, or their condensation products, the bleaching is carried out in the presence of Mg salts of proteins or protein products.

18. Stabilizing Bleach Baths, Such as Those of Sodium Peroxide Used For Bleaching Raw Cotton. D. J. Campbell and W. H. Loftus, to E. I. du Pont de Nemours & Co.). U. S. 2,333,916, November 9, 1943. A stabilized aq. soln. is used contg. a "peroxygen" compd. having a pH of at least 11.5, and stabilized with a soluble Mg salt such as $MgSO_4$, and $Na_4P_2O_7$.

19. Bleaching Natural and Regenerated Cellulose. Deutsche Gold-und Silber-Scheideanstalt vorm. Roessler. Belg. 449,839, April 1943. The material is treated with chlorite in (hot) acid soln. and then with an alk. soln. of peroxide. The treatments can be carried out in the same bath by addn. of peroxide after the first bleaching treatment. Cf. *Chem. Abstracts* 38, 3126[4]; 39, 820[5].

20. Bleaching According to (German Government) Regulations. F. Mossmann and H. Rettberg. *Klepzig's Textil-Z.* 45, 73-8 (1942); *Chem. Zentr.* 1942 I, 2211.—The whole subject of bleaching is discussed with reference to government regulations, including the structure of the cellulose fibers, degree of polymerization and its detn. according to Staudinger's method, boiling, bleaching of cotton, synthetic and mixed fibers with hypochlorite and with peroxide, washing and after-treatments for both types of bleaching baths, the detn. of the concn. of the baths and the calcn. of the Cl or H_2O_2 content of the baths.

21. Bleaching Cotton Knit Goods. E. S. Dunlap. *Textile World* 92, No. 4, 94-5 (1942). The precautions to observe in bleaching with chlorine and peroxide, alone and in combination, are discussed briefly. *Chem. Abstracts* 36, 5657 (1942).

22. Bleaching Textile Materials Such As Cloth in Rope Form. Donald J. Campbell and Francis L. Fennell (to E. I. du Pont de Nemours & Co.). U. S. 2,334,066, Nov. 9. An arrangement of app. is described, and a method of operation is employed which involves impregnating goods, such as those of various materials, with an aq. alk. soln. of a per-O compd. such as one of H_2O_2 and rapidly heating the impregnated material to 200-212°F. by contact with steam, then storing the goods both out of contact with the main body of alk. soln. and substantially out of contact with steam, as in an insulated compartment, so that heat losses are reduced but no further heating is effected, for

at least 30 min. (suitably 60 min.).

23. Stabilizing Bleach Baths, Such As Those of Na_2O_2 Used For Bleaching Raw Cotton. Donald J. Campbell and Wm. H. Loftus (to E. I. du Pont de Nemours & Co.). U. S. 2,333,916 November 9. A stabilized aq. soln. is used contg. a "peroxygen" compound having a pH of at least 11.5, and stabilized with a sol. Mg. salt such as $MgSO_4$ and $Na_4P_2O_7$.

24. Bleaching Textile Materials Such As Cloth in Rope Form. D. J. Campbell and W. F. Fennell (to E. I. du Pont de Nemours & Co.). U. S. 2,334,066 November 9, 1943. An arrangement of app. is described, and a method of operation is employed which involves impregnating goods, such as those of various materials, with an aq. alk. solu. of a peroxygen compd. such as one of H_2O_2 and rapidly heating the impregnated material to 200-212°F. by contact with steam, then storing the goods both out of contact with the main body of alk. soln. and substantially out of contact with steam, as in an insulated compartment, so that heat losses are reduced but no further heating is effected, for at least 30 min. (suitably 60 min.). *Chem. Abstracts* 38, 2512 (1944).

25. Bleaching Cellulose. Emil Scheller (to Deutsche Goldund Silber-Scheideanstalt vorm. Roessler). Ger. 736,070, April 29, 1943 (Cl. 55c.1). The cellulose is treated with Cl and immediately afterward H_2O_2 or substances yielding H_2O_2 are added to the bleaching liquor.

26. Bleaching Material. E. I. Du Pont de Nemours & Co. (to Imperial Chemical Industries Ltd.). Brit. 551,831, March 11, 1943. A peroxide bleaching bath, for bleaching of textile goods, has a pH of at least 11.5 and contains as stabilizer both Mg salt readily sol. in water and an alkali metal pyrophosphate, e.g. $MgSO_4$ and $Na_4P_2O_7$.

27. Fiber-Protective Washing and Bleaching in Textile Finishing With Especial Consideration of Hydrate Cellulose. G. Lietz. *Allg. Text.* Z. **1**, 48-52 (1943); *Chem. Zentr.* **1943, II**, 1512—Hydrate cellulose, its chemistry and structure, fiber-protective washing and fundamental washing operations (wetting of fiber, swelling of fiber and dispersion of the dirt in the bath) are discussed. The treatment should be faintly alk., with synthetic washing agents and without bowking. The bleaching agent should be used in the min. amt. necessary for formation of chloramines, or alkali and H_2O should be used sparingly; any residual bleaching ingredients should be removed completely. The bleaching period should be as brief as possible. In the Ce-Es process, without bowking, the goods are impregnated with Cl and bleached with H_2O_2.

28. Bleaching Packaged Goods. J. F. Shea (to Buffalo Electro-Chemical Co., Inc.). Canada 406,929, August 25, 1942. Textile fibers in package form are impregnated with 50-250% (on the wt. of the dry package) of a peroxide bleaching soln., steam is passed into and through the package. *Chem. Abstracts* 36, 6816 (1942).

29. Bleaching and Oxidizing Compositions. Joseph S. Reichert, Samuel A. McNeight and Arthur A. Elston (to E. I. Du Pont De Nemours & Co.). U. S. 2,287,064, June 23. A solid inorg. "peroxygen" compd., such as Na perborate monohydrate, is used, together with an org. acid in anhydride, such as benzoic, maleic, phthalic, succinic or glutaric acid anhydride, to form a dry, stable compu. which, in aq. solu., yields an oxidizing agent of high activity. Numerous examples with details are given.

30. Effecting Bleaching of Gray Vegetable Fibrous Material. H. O. Kauffmann and R. L. McEwen (to Buffalo Electro-Chemical Co.). U. S. 2,283,141, May 12, 1942. A method of treatment is employed which involves impregnating the gray goods with sufficient of an aq. acid soln. to dampen the same, heating the dampened impregnated goods with steam, then impregnating the goods with sufficient of an alk. peroxide soln. to dampen them and permitting them to bleach in the heated condition.

31. Percarbonates and Their Uses in the Textile Industry. Jean Salquain. *Teintex* 7, 164-6 (1942); *Chem. Zentr.* **1942 II**, 1865.—Permonocarbonates are produced by the action of CO_2 on Na_2O_2 or BaO_2. $BaCO_4$, a pale-yellow, water-insol. powder, is decompd. by water into $BaCO_3$ and H_2O_2. Perdicarbonates are produced in a 80% yield during the anodic oxidation of a satd. carbonate soln. $K_2C_2O_6$, blue and hygroscopic, decomposes with the evolution of O on heating; the addn. of water at 50° forms H_2O_2 The com. product in a Na perdicarbonate-H_2O_2 compd., $Na_2C_2O_6$ nH_2O_2. Percarbonates in alk. solns. are suitable for bleaching vegetable fibers, and in acid solns. for bleaching wools. They are suitable also as antichlor, for oxidizing agents for vat leuco dyes, washing and boiling-out agents.

32. Oxygen Bleaching Baths. H. Rohr. *Farber u. Chemischreiniger* **1942**, 32; *Chem. Zentr.* **1942, II**, 593. The loss-free storage of old peroxide liquors by mech. purification with a Seitz floating filter followed by acidification is described. If such a filter is not available then the bath is acidified, and the dirt is allowed to settle and is then drawn off from the bottom of the vessel.

33. Bleaching Cotton Fabrics Hard to Bleach. O. Ritter von Reich and H. Weiss. Ger. 723,613, June 25, 1942 (Cl 8*i*, 1). The fabrics are bleached intensely in a peroxide liquor at 70-90° in manner such that only a mild afterbleach is required. This is followed by bucking and finally by peroxide or by Cl bleach.

34. Bleaching Gray Goods of Unboiled Cellulose Such as Sheeting. H. O. Kauffmann (to Buffalo Electro-Chemical Co.) U. S. 2,231,426, Feb. 11, 1941. The goods are treated with an alk. peroxide soln. under conditions of low-liquor ratio until a partial bleach is obtained and then with an alk. peroxide soln. under conditions of high-liquor ratio until a complete bleach is obtained.

35. The Use of H_2O_2 Bleaches on Cotton and Staple Rayon. J. Clarou. *Teintex* 6, 254-7 (1941); *Chem. Zentr.*. **1941 *II***, 3141. A discussion of the bleaching of cellulose fibers in strongly alk., stabilized hydrogen peroxide baths, by pure hypochlorite and by mixed hypochlorite-hydrogen peroxide baths. *Chem. Abstracts* **38**, 2500 (1944).

36. Bleaching Vegetable Fibers Such as Gray Cotton Goods. H. O. Kauffmann (to Buffalo Electro-Chemical Co.). U. S. 2,257,716, September 30, 1941. Vegetable fibers in the gray state are impregnated with less than about 150% their wt. of an alk. bleaching soln. comprising a per compd. and a soap or the like, and heated while preventing any substantial evapn. This process increases absorbency of the fiber.

37. Bleaching of Fabrics Containing Cellulose Fibers. A. Danzinger, German 698,164, October 3, 1940. Fabrics contg. cellulose fibers, cotton fabrics in particular, are bleached in weakly alk. solns. of per salts. The solns. contain no alkali hydroxides. The bleaching starts at below 100° and the temp. is gradually raised as the concn. of active O_2 diminished. *Chem. Abstracts* 35, 7728.

38. Bleaching Cellulose Materials Such as Cotton Goods. H. O. Kauffmann (to Buffalo Electro-Chemical Co.). U. S. 2,189,378, February 6, 1940. A bleaching process is employed which involves satg. cellulose with a bleaching soln. comprising H_2O_2 and a quantity of alkali equiv. to 10 to 60 g. per l. of NaOH, eliminating the excess of the bleaching soln. from the cellulose so that the cellulose is damp, thereafter stacking the cellulose to maintain the same dampness, and permitting it to bleach in the damp condition.

39. Bleaching Cellulose Fibers in Peroxide Baths. K. Jellinek (to General Aniline & Film Corp.). U. S. 2,193,173, March 12, 1940. Material such as cotton yarn or piece goods which is to be bleached in an alk. peroxide bath is pretreated in a bath contg. 0.001-0.01 g. per l. of a water sol. Co salt such as the acetate which serves as a controlling agent.

40. Bleaching Fibers of Vegetable Origin Such as Gray Cotton Piece Goods. H. O. Kauffmann and H. G. Smolens (to Buffalo Electro-Chemical Co.). U. S. 2,220,682, November 5, 1940. The dampened goods are treated with a bleaching soln. including a per compd. and are stacked in a damp. condition and permitted partially to bleach in the damp condition without consuming all the per compd. and are thereafter heated while preventing substantial evapn. of moisture from them. NaOH, H_2O_2 and Na silicate may be used in soln. together.

41. The Modern Cotton Bleach. Elbey, *Ind. Textile* 57, 171-2 (1940); *Chem. Zentr.* **1940 II**, 571. A description of a combined hydrogen peroxide bleach followed by a hot alk. H_2O_2 bath.

42. Damage Caused By Catalysis in Bleaching With Oxygen Bleaches. J. Letissier. *Teintex* 5, 269-73 (1940); *Chem. Zentr.* **1941, I**, 2061. A general discussion of H_2O_2 bleaching; its mechanism; practical methods of use; its effect on the fibers; the role of metal catalysts, especially Fe and Cu; the formation of readily decomp. metal peroxides (e.g. Fe^{++}-Fe_2O_6-Fe^{+++}-e^{++}); the possibility of destroying the action of the catalysts by poisoning as with

HCN, HCNS, H_2S and similar org. compds.; the interference of water glass, Na pyrophosphate or aliphatic alc. sulfonates with the splitting off of O_2; the Fe and Cu content of the fibers, the danger of such content and its detection analytically; and the slight importance of catalytic injury with wool.

43. Bleaching Agents in the Textile Industry. R. Gardenas S. *Seguridad* (Santiago) No. 46, 31-2 (1941); *Ind. Safety Survey* (*Intern.*) 17, 113. NaClO H_2O_2 and Na_2O_2 produce fire and explosion hazards and may cause occupational poisoning. Na_2O_2 is the most dangerous of the three. Precautions for the use of these substances are listed.

44. The Use of H_2O_2 Bleaches on Cotton and Staple Rayon. J. Clarou. *Teintex* 6, 254-7 (1941); *Chem. Zentr.* 1941, II, 3141. A discussion of the bleaching of cellulose fibers in strongly alk., stabilized H_2O_2 baths, by pure hypochlorite and by mixed hypochlorite-H_2O_2 baths.

45. Bleaching Baths for Fabrics. Zschimmer & Schwarz Chemische Fabrik Dolau. Ger. 716,215, Dec. 11, 1941 (Cl 8*i*. 1). Peroxide bleaching baths contain highly dispersed suspensions of H_2O-insol, salts of polyvalent metals and higher fatty acids.

46. Stabilizers Suitable for H_2O_2 Bleaching Baths. P. Colomb. *Teintex* 6, 222-6 (1941); *Chem. Zentr.* 1941, II, 3140. A discussion of the patent and trade literature dealing with stabilizers as NaH_2PO_4, Na_2HPO_4 boric acid, borates, aromatic amines. Ba and Mg salts, higher aliphatic alcs., Sn salts, starch, benzene and xylene. Practical examples for H_2O_2 bleaches with the addn of $Na_4P_2O_7$ or Na_3PO_4 are described.

47. The Behavior of Cotton-Staple Rayon Mixtures Toward Alkaline Solutions. *Chem. Abstracts* 1939. Leo Kollmann. Monatsh, Seide *Kunstseide u Zellwolle* 44, 142-6, 148 (1939). The fibers of staple rayon mixed yarn are weakened by pressure boiling and bleaching; however, this damage is minimized by the use of O bleaches. The best results are obtained by a combined Cl and O bleach of unboiled textile as well as with an O bleach of textile which had been boiled in the open with Na_2CO_3. During mercerization it is necessary to adhere closely to the standard addn. of NaCl, temp. of base and rinsing water. A decrease of strength occurs only in vat dyeing which has not been explained. In general no appreciable decrease of the strength of the fiber occurs during dyeing in an alk. medium.

48. The Use of Persalts and of Hydrogen Peroxide. *Chem. Abstracts* 1939. C. Couallier. *Rev. Marques Parfums France* 16, 65-6 (1938). A brief review and discussion of their use as bleaching agents.

49. Stability of Hydrogen Peroxide Bleach Solutions. B. A. Harold. *Chem. Abstracts* 1939. *Am. Dyestuff Reptr.* 28, 1-5 (1939). Methods of H_2O_2 manuf. are listed. Results of expts. on the stability of peroxide solns. are shown in curves and tables. For well-controlled bleaching of cotton a properly silicate-buffered peroxide soln. with NaOH as the alkali yields a smooth and consequently efficient decomp. In wool bleaching, uniform decompn. results from the use of: (1) proper temp., (2) properly buffering the soln. with silicate or pyrophosphate of Na and (3) adjustment of pH with Na_4OH.

50. Stability of Hydrogen Peroxide Bleaching Baths. J. Francizat. *Chem. Abstracts* 1939. *Tiba* 16, 665,71 (1938). A brief discussion of the principal factors which affect decompn. of H_2O_2 in bleaching baths.

51. Stabilizing Peroxide Baths. Soc. pour l'ind. chim a bale. Swiss 197,839, Aug. 16, 1938 (Cl 24a). *Chem. Abstracts* 1939. Alk. peroxide baths are stabilized by adding the sulfonation products of imidazoles contg. at least one aliphatic residue with at least 7 C atoms, or their salts, such as N-methyl-heptadocylbenzimidazolesulfonate.

52. Causes of Hydrogen Peroxide Losses During Hydrogen Peroxide Bleachings. Louis Bonnet, *Teintex* 4, 22-6 (1939). *Chem. Abstracts* 1939. Violent agitation by circulating pumps seems to be the source of the greatest H_2O_2 losses. A sketch is given of app. used to get circulation by means of 2 vats that can be raised and lowered. These vats are piped to the bleach-contg. vats by flexible piping. By this method of circulation 40% of the losses were eliminated. B. makes the following suggestions of using H_2O_2: (a) minimize the amt. of agitation in the baths, (b) introduct the H_2O_2 at the lower end of the vats so that the column of liquid is unbroken, (c) replace the circulating pumps by the app. described above.

53. Bleaching Vegetarle Textile Fibers. Union chimique belge, Soc. anon. Belg. 429,223 Aug. 31, 1938. *Chem. Abstracts* 1939. Bleaching is carried out after boiling at a temp. above 100° in a liquor contg. active O at low concn. and in amt. just sufficient for the treatment of a single charge.

54. Bleaching Animal and Vegetable Fibers. Leo Frenkel (to Hatters' Fur Exchange, Inc.) U. S. 2,153,416, Apro. 4 *Chem. Abstracts* 1939. Fibers such as rabbit hair, wool or ramie are treated with a soln, formed of $(CH_2)_6N_4,H_2O_2$, a catalyst such as Na pyrophosphate and a detergent comprising an oil together with one or more chlorinated compds. and an emulsifying agent.

55. Bleaching Silk Piece Goods With Hydrogen Peroxide. F. Weber. *Melliand-Textilber.* 20, 209-10, 282-4 (1939) *Chem. Abstracts* 1939. A review of modern methods of carrying out and controlling the bleaching of various types of silk goods with H_2O_2 as supplemented by subsequent treatment with SO_2 in case very pure whites are desired.

56. Experiments on the Use of Sodium Peroxide in the Bleaching of Cotton Fabrics. V. N. Polunina. *Khlopchatobumazhnaya Prom.* 7, No. 7-8, 44-8; No. 9, 32-6 (1937) *Chem. Zentr.* 1938, I, 1936, *Chem. Abstracts* 1939. Various kinds of raw cotton fabrics and similar materials can be well bleached with peroxide; a preliminary boiling with alkali is unnecessary. Before heating, the fabric must be uniformly wet with the peroxide. Heating with H_2O_2 for 3 hrs. at 80-5° is sufficient. The material shows sufficient whiteness, capillarity and strength and is superior to the normal product in these respects. Such materials are stronger than those bleached with Cl. The total consumption of peroxide for wetting the fabric and heating amounts to 2-3.25% Na_2O_2 or 0.87-1.4% H_2O_2 Perhydrol and not Na_2O_2 is to be used. A concn. of 0.75 g. active 0 in the heating liquid is sufficient. The total alky. toward Me orange (water glass + NaOH) should be 5 g./l. Good results are obtained in bleaching fabrics of artificial silk, cotton, cottonins, and part-linen fabrics.

57. Peroxide Bleaching. H. G. Smolens. *Am. Dyestuff Reptr.* 28, 495-6, 498 (1939) *Chem Abstracts* 1939. A brief report of developments and progress during the past several years in the peroxide bleaching of silk, wool, cotton, white goods and rayons of all types.

58. Bleaching with Hydrogen Peroxide. Its Use On Cotton and on Staple Fiber. H. Morand. *Ind. textile* 54, 561-3 (1937); *Chem. Zentr.*. 1938, I, 2279. *Chem. Abstract* 1939. Bleaching with H_2O_2 in strongly alk. baths (NaOH) with the use of stabilizers (Na silicate and Mg. salts) is to be considered for treatment of vegetable fibers. The following bleaching processes are in use: the old process with pressure bucking and Cl bleaching; the process with pressure bucking, Cl bleaching and subsequent bleaching with H_2O_2, which prevents yellowing bleaching with Cl without pressure bucking; one-bath bleaching with H_2O_2, especially for colored fabrics; 2-bath bleaching with H_2O_2; the CS process of the Bohme Fettchemie with Cl and H_2O_2 and the one-bath process with H_2O_2; bleaching without bucking using H_2O_2 Cl, then H_2O_2 Bleaching with H_2O_2 after boiling with or without pressure. For fabrics contg. staple fiber bleaching with H_2O_2 without bucking is recommended, since boiling in alkali attacks the staple fiber.

59. Plant Experiments for the Bleaching of Linen with Hydrogen Peroxide. O. E. Itina. *L'no-Pen'ko-Dzhutovaya Prom.* 8, No. 5, 3308 (1938); *Khim. Referat. Zhur.* 1, No. 11-12, 140-1 (1938) *Chem. Abstracts* 1939. The bleaching can be performed either with H_2O_2 or by the combination method (alk. boiling, bleaching with hypochlorite, acidification, bleaching with H_2O_2, acidification). The H_2O_2 bleaching is more expensive than the combination method, but it results in less loss of wt. and of durability of the cloth. The combination method is recommended for coarse cloth, as it gives better results than the hypochlorite or H_2O_2 methods. Bleaching with H_2O_2 should be carried out for 3 hrs. at 80-85° with a concn. of H_2O_2 of not over 2% of active O based on the wt. of the cloth, with 15 g./l. of silicate (38° Be.) with an addn. of soap and of NaOH such that the total basic strength of the soln. is 3.5-4 g./l. of

NaOH and the ratio SiO_2:Na_2O as close to 1 as possible.

60. Peroxide Bleaching of Linen Fabrics. V. I. Minaev, P. V. Moryganov and A. I. Davydova Lno. *Penkoshutovaya Prom.* 7, No. 3, 42-56(1937); *Chem. Zentr.* 1938, I, 3134-5. *Chem. Abstracts* 1939. The H_2O_2 bleaching of linen fabrics is done after a preliminary boil-out. A 3 bath process is used, treatment in each bath being for 3 hrs. After bleaching the goods are washed with hot, then cold, water and dried. The active O used is 3% of the wt. of the fab. ric. The optimal total alky. produced by silicate and NaOH, is 5 g./l. expressed as NaOH. At reduced alkyl. the capillarity is less; too high alky. results in rapid decompn. of the peroxide bath and greater damage to the fabric. The optimum temp. is 90°. The emulsifying agents, Turkey-red oil, naphthene soaps. Kontakt, cottonseed oil, and olein soaps, were tested for increasing the stability of the bleaching bath. Turkey-red oil gave the best results; Kontakt was also effective. Fabrics bleached in this manner have greater whiteness, higher capillarity, and suffer less loss of strength than those bleached by the usual Cl bleaching methods.

61. Bleaching Textiles. Ernest Butterworth, Bertram P. Ridge, Frazer & Haughton Ltd. and Imperial Chemical Industries Ltd. Brit. 499,873, Jan. 30, 1939, *Chem. Abstracts* 1939. In bleaching cellulose materials by the process of 489,496, the alk. soln. of an oxidizing bleaching agent is a soln. contg. H_2O_2 and Na_2CO_3. The goods may also be scoured with a liquor contg. H_2O_2 and Na_2CO_3 prior to the treatment with the buffered hypochlorite soln. and the soln. used on a previous batch of material in the alk. peroxide bleaching step may be used for this purpose after suitable adjustment of its alkali and (or) peroxide content.

62. Bleaching and Cleansing Agents Suitable for Treating Textile Materials. Otto Lind (to Henkel & Cie. G.m.b.H.) U. S. 2,152,520, Mar. 28. *Chem. Abstracts* 1939. An O-yielding compd. such as Na perborate is used with 1-3 times its quantity each of a water-sol. salt a phosphoric acid contg. less molecularly combined water than H_3PO_4 and an alkali metal salt forming an aq. alk. soln., such as tetra-Na pyrophosphate and soap.

63. Hydrogen Peroxide Bleaching. D. Abraham, *Indian Textile J.* 49, 156-7(1939) *Chem. Abstracts* 1939. The preliminary treatment to the peroxide bleach is known as "bottoming." Steps included are: (1) singeing, (2) steeping, (3) lye boiling or bowking, (4) Cl bleach and (5) souring. The H_2O_2 process is outlined.

64. Bleaching Cotton Knit Goods—The Bleach Process as the Key to Quality. L. P. London. *Am. Dyestuff Reptr.* 27, 627-8(1938). *Chem. Abstracts* 1939. A general discussion of bleaching methods brings out the following advantages of kier bleaching with peroxide: (1) flexibility in mill operation, (2) low weight loss in the cloth, (3) the chem. treatment in the kier is milk, making for high tensile strengths, (4) the operation does not require abnormal stretching of the cloth and a natural feel is retained, (5) a min. of shinkage and (6) permanent whiteness.

65. The Peroxide Bleach for Cotton and Rayon Mixtures. H. Baier. *Textile Mfr.* 63, 424(1937) *Chem. Abstracts* 1938. A review of the German position of Peroxide bleaching and the various process in which it may be used. The uses and limitations of 10 peroxide processes are cited. An eleven-year test shows that chlorine yellowing can be prevented by after-bleaching with peroxide.

66. Recent Progress Obtained in the Bleaching of Textile Fibers. Gordon-Abramow. *Rev. Gen. Mat. Color.* 42, 346-9(1938) *Chem. Abstracts* 1938. A review and comparison of the results obtained by workers in this field, with the greatest consideration on the use of H_2O_2.

67. Peroxides in Bleaching. J. Dumas. *Rev. Gen. Mat. Color,* 41, 512-15 (1937) *Chem. Abstracts* 1938. The use of peroxides as disclosed by various researches and patents is discussed. Four references.

68. Degree of Whiteness Obtainable By Bleaching—Its Relation to Varieties of Cotton. G. B. Jambuserwala. *Am. Dyestuff Reptr.* 26, 799-802 (1937) *Chem. Abstracts* 1938. The degree of purity obtainable through bleaching is not always coincident with the degree of whiteness. Objects of the investigation are: (1) to ascertain the purity of bleached samples by estg. the residual ash and fatty matter; (2) to est. the degree of whiteness by measuring the intensity of daylight reflected from the surfaces (a photoelec. cell equipment provided with an amplifier and a galvanometer is used); (3) to correlate the last 2 detns. with visual estn. of differences in whiteness in different varieties of cottons. Five varieties of cotton (2 Indian, Egyptian, Uganda, and American) were used and the bleaching agents were: perchloron, NaClo, H_2O_2 and Na_2O_2. Whiteness detns. by the photoelec. cell method agree well with the visual in most cases. The whiteness effects by visual examns. are borne out by (1) whiteness values (2) fatty-matter values and (3) ash-content values.

69. Degumming, Bleaching and Printing Textiles. Paul J. Stierlin. Fr. 819,306 Oct. 14, 1937. *Chem. Abstracts* 1938. The product resulting from the combination of 1 mol. of H_2O_2 with 3 mol. of urea is used in oxidizing treatments of cotton silk, rayon and wool in place of H_2O_2.

70. Bleaching Cotton and Other Fibers. Hugo Weiss and Ottmar R. von Reich. *Chem. Abstracts* 1938. Fr. 817,313 Sept. 1, 1937. The fibers are treated with a bath contg. a peroxide and a caustic alkali at 90-100°.

71. New Stabilizers for the Oxygen Bleach. Willy Berg. Wollen- & Leinen-Ind. 57, 301(1937) *Chem. Abstracts* 1938. Pentazikon TB 11 retards the velocity of decompn. of H_2O_2 and thus protects the fiber. Unprotected H_2O_2 liberates O irregularly and quickly. Pentazikon TB 11 is effective even in hard water. The following formula is recommended: Ratio 1:10; addn. per 1.:1.2g. Pentazikon, 21 cc. 40% H_2O_2, 0.9 cc. NH_4OH. Fe and Cu metal parts should be avoided as they cause the catalytic decompn. of bleaching liquor.

72. Organic Stabilizers of Hydrogen Peroxide for Bleaching Operations. R. Folgner. *Monatschr. Textil-Ind.* 52, 257-9 (1937) *Chem. Abstracts* 1938. A discussion of the use of various patented stabilizers.

73. The Use and Action of Hydrogen Peroxide on Textiles. Fritz Ohl. *Kunstseide u Zellwolle* 19, 354-8(1937) *Chem. Abstracts* 1938. H_2O_2 bleaching should be carried out in pinewood, Haveg, Al or stoneware vessels. Traces of Cu ar every damaging, and hence H_2O_2 is not adaptable for bleaching cuprammonium rayon or staple rayon. Freedom for Fe, especially in the water supply, is also essential. As stabilizers in the of rayon or mixt. fabrics, Na silicate, Leukofix, and Pentazikon TB are recommended; the bleaching time is thereby prolonged, but greater uniformity results. As a general rule, safe times and temps. for bleaching cotton, Vistra, or Aceta yarns are as follows: for cocns. of 30% H_2O_2 solns. up to 10cc. per 1., no longer than 10 hrs. at 20°, 5 hrs. at 50°, or 5 hrs at 100°; for concns. up to 25cc. per 1., 5 hrs. at 20°, 3 hrs. at 50° or 1 hr. at 100°.

74. Bleaching Various Fibrous Materials, Hans O. Kauffmann (to Buffalo Electro-Chemical Co.) U. S. 2,107,295, Feb. 8, *Chem. Abstracts* 1938. Various artificial, animal or vegetable fibers are satd, with a bleaching soln. contg. a high concn. of peroxide, excess soln. is removed, leaving the material damp, and the damp material is stacked and permitted to bleach.

75. Bleaching of Animal Fibers, Elektrochemische Werke Munchen A.-G. Ger. 656,195 Feb. 1, 1938 (Cl. 8i.1). *Chem. Abstracts* 1938. In bleaching animal fibers in baths contg. H_2O_2 or like oxidizing agent, use is made of baths contg. also H_2SO_4 about 0.1-0.2 and a salt of Mg, particularly $MgSO_4$ about 10g. per 1. An example is given.

76. Bleaching Cotton and Like Materials. Hugo Weiss, U. S. 2,116,322, May 3. *Chem. Abstracts* 1938. The material is first treated with an intensively acting alk. bleaching bath of an agent capable of splitting off oxygen contg. caustic alkalies such as a peroxide bath and the bleached goods are then subjected to a boiling and to a second bleaching in a Cl bleaching bath.

77. Notes on Cotton Bleaching. J. Dumas. *Rev. Gen. Mat. Color.* 42, 67-9(1938) *Chem. Abstracts* 1938. In bleaching tests, cottons differed, in the general order, Egyptian, American, Surat, Uganda and Indian, the last giving the poorest white. Judging by the eye agreed 32 cases out of 40, with detns. by means of the photoelec. cell. Tabulated results are given for bleaching with perchloron, NaClO, H_2O_2 and Na_2O_2.

78. The New Developments in the Hydrogen Peroxide Bleaching Method. E. Meissner *Deut. Wollen-Gewerbe* 59, 631-2 (1937). *Chem. Abstracts* 1937. A survey.

79. Peroxide Clarifier, I. J. Fred Oesterling and Pauline Beery Mack. *Laundry Age* 16, No. 5, 14-16, 87(1936) *Chem. Abstract* 1937. H_2O_2 was investigated as a possible substitute for Cl bleach in com. laundering. The effect of the H_2O_2 upon the breaking strength of bleached fabrics was detd. over a range of pH, cocn. temp. As the pH of the bath increased, the loss in breaking strength of bleached fabric increased. Thus when 2 quarts of H_2O_2 (1% available O) was used for each 100 lb. of fabric, a 6.0% loss in breaking strength was reported at pH 6.3, and a 20.4% loss at pH 10.5. At pH 10.5 greater losses were obtained when Na carbonate was used as the alkali than when Na Metasilicate was used. Losses in breaking strength increased only slightly when the temp. was increased up to 71°. At higher temp., however, losses were increased markedly. Loss in breaking strength changed very little, 2.8% increase, when concn. of bleach was increased fourfold. Under proper conditions whiteness retention and stain removal are as good with H_2O_2 as with Cl. Data are given on results obtained by 1 institutional and 4 com. laundries which use H_2O_2 as a bleach. II. More about bleaching. *Ibid.* No. 6, 58-64.

80. Bleaching of Cotton Goods Containing Metal Effect Threads. W. Hundt. *Melliand Textilber*, 81, 228(1937). *Chem. Abstracts* 1937, Tinsel threads (contg. Cu or brass) are protected and their deleterious catalytic action is avoided by bleaching with aq. H_2O_2 (2-3 cc. of 40-vol. H_2O_2 per l.), stabilized with waterglass and soap and contg. 0.5 g. of lamepon A per l.

81 The Peroxide Bleaching Method and Its Application on Cotton and Mixed Fabrics. Hermnn Baier. *Deut. Wollen-Gewerbe* 69, 857-8; *Spinner u. Weber* 55, No. 31, 8; *Klepzig's Textil-Z.* 40 454-5, 464-6; *Monatsh, Seide Kunsteide* 42, 296(1937). *Chem. Abstracts* 1937. The peroxide bleach includes fewer steps than older methods of bleaching. The best types of bleaching, suitable methods and distinct advantages of this procedure are described for several woolens, rayon and cotton goods. While faintly alk. peroxide baths are used for the bleaching of animal fibers in the presence of phosphates, plant fibers are bleached in strongly alk. peroxide baths. The greatest hazard to cellulose in bleaching is elementary O. Undissocd. neutral solns. of H_2O_2 attack cellulose without removing its impurities. The bleaching action of H_2O_2 is due to the presence of ions formed upon the addn. of alkalies. The stabilizer tends to prevent the formation of elementary, injurious O. During the bleaching of mixts. of cotton and staple rayon, the rayon is attacked (or dissolved) more readily by boiling with alkalies than by the use of the peroxide method in which there is no alk. boiling.

82. Stabilizing Wool Bleaching Baths. Joseph S. Reichert and Ralph B. Elliott (to duPont) (U. S. 2,091,186, Aug. 24. *Chem. Abstracts* 1937. A process for stabilizing a wool bleaching bath consisting essentially of a dil. soln. H_2O_2 which is acid in reaction and which contains metallic catalytic impurities serving to promote decompn. comprises removal of the catalytic impurities by intimately bringing the bleaching bath into contact with an adsorbent material consisting of substantially pure cellulose fibers matted together in the form of a plurality of thin porous sheets, whereby the metallic catalytic impurities are adsorbed.

83. Bleaching by Hydrogen Peroxide. E. I. duPont deNemours & Co., Joseph S. Reichert and Ralph B. Elliott. *Chem. Abstracts* 1937. Brit. 466,112, May 18, 1937. The decompn. of acidic solns. of H_2O_2 used in the bleaching of wool, etc., is retarded by withdrawing the peroxide soln. from the bleaching vat and filtering it through absorbent cellulosic material, e.g., a Kimpak cellulose filter. The filtered soln. is returned to the vat free from catalytic impurities e.g., Fe, Cu, Ni, Mn, metallic oxides.

84. Organic Peroxide Compounds. Bohme Fettchemie-Ges. m.b.H. (Karl Butz, inventor). Ger. 649, 322 Aug. 20, 1937. *Chem Abstracts* 1937. Pyrophosphoric esters of higher aliphatic alcs, are treated with H_2O_2 or inorg. per salts. Stable compds. useful as combined washing and bleaching agents are obtained. Examples are given.

85. Bleaching Fibers, Etc., With Hydrogen Peroxide. Ehrhart Franz. U. S. 2,081,327, May 25. *Chem. Abstracts* 1937. A Cl-free bleaching process involves the use of H_2O_2 soln. rendered acid with H_2SO_4 together with a sulfate such as Na_2SO_4 or with boric acid, H_3PO_4 or an org. acid such as isobutyl naphthalene sulfonic acid, etc.

86. Bleaching Textiles. Ehrhart Franz. Brit. 451,115, July 29, 1936. *Chem Abstracts* 1937. Textile fibers, yarns and fabrics are bleached by means of a nonalk. bleaching bath contg. H_2O_2 stabilized by an org. acid, H_3PO_4, or H_3BO_3, the goods traveling continuously through the bath or the liquor being maintained in continuous flow into and out of the bleaching vessel or the goods and the liquor flowing in counter-current through the vessel. Suitable org. acids are $(COOH)_2$, lactic. The presence of H_2SO_4, HCl and HNO_3 is excluded. The goods may contain activators, e.g., soap or alkali, and the bath may contain protective agents, e.g., glue, gelatin, or CH_2O.

87. Peroxide Bleaching Of Cotton Goods. V. I. Minaev and N. N. Kuzub. *Byull. IvNITI* 12, No. 6, 3-19 (1936). *Chem. Abstracts* 1937. Expts, in bleaching of cotton goods with alk. H_2O_2 soln. in stationary kiers, with and without preliminary boil-out with NaOH, are described. Cotton was treated with H_2O_2 (obtained by decompn. of K_2O_2 with H_2SO_4) with the addn. of Na_2SiO_3 and olive-oil soap. In some runs NaOH was added. Optimum conditions were: 0.9-1.5% H_2O_2 on the wt. of goods, raising the temp. rapidly to 80°, bleaching at 90° for 1.5-2 hrs., depending on the goods total alkyl. 0.6% (based on NaOH). To prevent the sepn. of SiO_2, a mixt. of Na_2SiO_3 and NaOH, contg. SiO_2 and Na_2O in proportion to 1:1 with a slight excess of SiO_2 was used. As compared with the Cl bleaching process, the peroxide method gave cotton goods of greater whiteness, equally good phys. and chem. consts., slightly greater ash content and nearly equal capillarity. The goods bleached without preliminary boil-out with NaOH gave lighter shades in dyeing. The presence of Fe plates caused more rapid decompn. of H_2O_2 than that of Cu plates, while Cu salts are more highly active than Fe salts. The cotton goods were protected from contact with metal by applying a mixt. of 6 kg. $Ca(OH)_2$, 6 l. milk and 5 eggs to the internal kier walls, followed by treatment with Na_2SiO_3 (96 kg. in 4000 l. H_2O) at 1-1.5 atm. for 4-5 hrs.

88. The Behavior of Mixed Fabrics of Cotton and Staple Rayon with Various Bleaching Methods. H. Baier and W. Hundt. *Melliand Textilber*, 18, 301-4(1947). *Chem. Abstracts* 1937. Five bleaching methods were studied. Loss in weight and change of properties with each are reported.

89. Bleaching Cotton Goods. James A. Clark and Harry G. Smolens (to Buffalo Electro-Chem. Co.) U. S. 2,029,985, Feb. 4. *Chem. Abstracts* 1936. The goods are moistened with an aq. H_2O_2 soln. and then subjected to a temp. above the b.p. of the soln. in an atm. contg. steam for a sufficient time to produce the desired bleaching effect. App. is described.

90. Peroxide Bleach Baths and Some Factors Influencing Their Stability. D. J. Campbell. *Am. Dyestuff Reptr.* 25, P67-70 (1936). *Chem. Abstracts* 1936. Six major factors influence the stability of a peroxide bleach bath: (1) temp., (2) pH, (3) type of alkalinizing agent, (4) the cotton, (5) the water and (6) the bleaching vessel. Each factor is discussed.

91. Oxygen Bleaches. Fritz Ohl. *Spinner u. Weber* 54, No. 9, 26-30(1936) *Chem. Abstracts* 1936. No bleaching agent is known which under certain conditions will not produce disagreeable side reactions. The use of O-contg. bleaches is discussed. K water glass which is low in alkali concn. is better than the ordinary grades of Na water glass as alkalizing and stabilizing agents for H_2O_2 bleaching baths. No optimum concns. can be fixed for O bleaching baths, but these concns. can be detd. from a study of the textile material to be bleached and the particular conditions of operation. O-contg. bleaches do not have a greater fiber-damaging effect than have Cl bleaches.

92. Stabilizers for Hydrogen Peroxide Bleaches. Johannes Porzky. Z. *Ges, Textil-Ind.* 39, 451-2 (1936). *Chem. Abstracts* 1936. The faint alk. reaction of H_2O_2 bleaches as caused by the addn. of NaOH, NH_4OH or Na_2CO_3 facilitates the liberation of O and activates the bath. The excessively high rate of decompn. of the bath, particularly at elevated temps., is avoided by the addn. of stabilizers as water glass, borax and phosphates. Tables show the stability of the acid bath at 20°, 40°, 68° and 85° and the effect of $MgSO_4$, $CuSO_4$, and $FeSO_4$ on the NaOH-H_2O_2 bath at 20°, 40°, 68° and 90°. The velocity of decompn. of H_2O_2 is increased by metallic salts, particularly Fe, Cu, Mo and Tu,

while it is decreased by acids, glue, casein, gelatins, fatty alc. sulfonates and fatty acid condensation products. To det. the effect of stabilizers, mixts. of these together with H_2O_2 were placed in thermostatically controlled 500-cc. vessels and the stabilities tested after definite time intervals by pipetting out 10-cc. portions, adding to 100 cc. H_2O and 15 cc. 0.25 N H_2SO_4 and titrating to faint pink with 0.1 N $KMnO_4$. The results of these expts. show that NaOH causes a rapid oxidation in the bleaching baths.

93. Bleaching Textile Materials. Ehrhart Franz. Fr. 798,566, May 20, 1936. *Chem. Abstracts* 1936. Agents are used which liberate H_2O_2 but which are stabilized by the addn. of agents forming colloidal solns. e.g., glue, gelatin, SiO_2 gel, sugar, mannitol, dextrose, glucoside, salts of aromatic sulfonic acids of high mol. wt., sulfuric and phosphoric esters of aliphatic alcs. and sulfonic acids contg. more than 11 C atoms, e.g., Na octadecylmethylaminoethylsulfonate. Ferments or enzymes or compds. of Cu or Mn may be added as activators.

94. Bleaching Fibers. B. Laports Ltd. and Isaac E. Weber. Brit. 434,599, Sept. 5, 1935, *Chem. Abstracts* 1936. Vegetable textile fibers are bleached in a bath consisting of a peroxide to which a metaphosphate or HPO_3 has been added. Na silicate, Na_2Co_3 NaOH, etc., may be added to give the bath any desired alkyl.

95. Bleaching Cellulosic Fibers. Adolf Danzinger. Austrian 143,295, October 25, 1935 (Cl 8c) *Chem. Abstracts* 1936. Natural or artificial cellulosic fibers, particularly cotton, are bleached with solns. of per compds. at a temp. above 80°, preferably above 100°, under a pressure of at least 1.5 atm. Weakly alk. baths are preferably used. A bucking treatment in a relatively strong bath may precede the bleaching. Sp. processes are described.

96. The Dyeing of Spun Rayons. Georg Rudolph. *Monatschr. Textil-Ind.* 51, *Facheft* II, 44-6 (July 1936) *Chem Abstracts* 1936. Spun rayon is bleached by either of the following 2 methods: (1) Treat for 2 hrs. at 70-75° with a bath contg. in 1 1.4 cc. 30% H_2O_2, 6 g. water glass and 0.5 g. NaOH or 5 g. Na pyroprosphate, and 1-2 g. Igepon T. (2) Treat for 1 hr. at room temp. with 1 g. active Cl per l. After ringing treat for 2 hrs. at 70-75° with a bath contg. in 1 l. 1 cc. 30% H_2O_2, 6 g. water glass, 0.5 g. NaOH and 1-2 g. Igepon T. Dyes are listed suitable for dyeing spun rayon yellow, orange, red, brown, violet, blue, green, gray and black; dyeing directions are given and 11 samples of dyed spun rayon yarn are shown.

97. Some Practical Pointers in Bleaching Cotton and Cotton Rayon Fabrics. Thomas F. Hughes. *Rayon and Melliand Textile Monthly* 16, 666-8 (1935) *Chem. Abstracts* 1936. Lime, caustic soda and peroxide bleaching in processes, and sources of damage in bleaching are considered.

98. Bleaching Procedure. Otto Mecheels, G. Dierkes, E. Feller and E. Rudolf *Melliand Textilber.* 16, 725-9 (1935) *Chem. Abstracts* 1936. To obtain max. whiteness for cotton and rayon textiles, peroxide bleaches should be heated to 80° in about 30-45 min. and from 80° to 100° in about 3.5 hrs. Iron or rust in the bleach reduces its efficiency. Peroxide bleaches of mercerized cotton and of viscose rayon showed greater whiteness lower luster and greater softness than similar Cl bleaches.

99. Bleaching Textiles. Gert. v. Transehe-Roseneck. Brit. 439,802, Dec. 9, 1935. *Chem. Abstracts* 1936. Textile materials are bleached by a nonalk, liquor contg. H_2O_2 or a compd. that yields H_2O_2 in aq. soln., the liquor being fully inactivated by the addn. of an inactivator other than H_2SO_4, HNO_3 or HCl, with application to the materials, before their introduction into the liquor of an activator that is retained by the goods without substantial diffusion into the liquor. The inactivator and the activator are both free from metal of at. wt. above 45. In examples, (1) animal hair is washed with soap and H_2O, rinsed so that it retains about 1% of soap, worked into tops which are placed for 2 min. in an aq. bath at 40° contg. H_2O_2 and $(COOH)_2$ with or without an oxalate, hydroextd. or squeezed and dried, and (2) wool in the form of tops is placed for 30 min. in a $KMnO_4$ soln. slightly acidified with H_2SO_4 or with an addn. of $MgSO_4$; the wool thus stained brown and made slightly alk. is rinsed while retaining alkyl. and placed for 2 min. in a bath at 30-40° contg. H_2O_2, H_2SO_4 and $(COONa)_2$ and, alky. still being maintained, is placed for 10-30 min. in a similar bath contg. H_2O_2 and $(COOH)_2$; it is then rinsed, cleared in a soln. contg. $NaHSO_3$ and H_2SO_4 and if bleaching to pure white is desired, further treated for 3-6 hrs. in a $NaHSO_3$ soln. at 35-45° and finally rinsed and acidified.

100. Kier Bleaching of Cotton Fabrics With Sodium Peroxide. D. J. Campbell *Cotton* 100, 54-6 (June, 1936) *Chem. Abstracts* 1936. There are 2 general procedures that are followed in the bleaching of cotton fabrics. In one process, the cotton is given a preliminary boil-out with NaOH before bleaching. This operation is employed in the bleaching of woven goods contg. no dyed patterns and are to be dyed or finished for market whites after bleaching. In the second process, the gray cotton is given a treatment in a NaOH bleach bath without the preliminary boil, and is applied to fabrics contg. dyed yarn such as towelling and shirting. Knit goods requiring softness in the finished fabrics are bleached in this manner. It is concluded that bleaching cotton peroxide takes place more slowly than when NaClO is used. The operations are all completed in one kier; the amt. of water required per pound of goods in peroxide bleaching is much less than in NaClO bleaching.

101. The Decomposition of Perborate Bleaching Baths. Kehren. Z *Ges. Textil-Ind.* 39, 370-1 (1936). Modern perborate bleaches are very stable and give off the active O only very slowly if used properly. Decompn. is slower in hard than in soft water because of the stabilizing effect of Ca and Mg salts. Com. liquid H_2O_2 bleaches must contain a stabilizer on account of its ease of decompn.; this is unnecessary in solid perborate bleaches. Water glass does not affect the stability of bleaches in distd. water; in hard water it has a stabilizing effect due to formation of Ca and Mg silicates. The stability of an O bleaching agent is decreased by increasing alky. of the bath. The more alk. the bath the smaller its stability. Since bleaching follows prewashing with soap and soda without rinsing, the bath is always somewhat alk. in practice. *Chem. Abstracts* 1936.

102, Bleaching Fabrics. Paul Van A. Comey (to R. H. Comey Brooklyn Co.) U. S. 2,037,-119, April 14. *Chem. Abstracts* 1936. A fabric such as one of cotton is treated with a cold soln. of H_2O_2 to wet it thoroughly, excess liquid is removed, and the fabric is then treated with NH_3 gas of a concn. substantially that obtained by heating about 165 cc. of 26° NH_4OH to about 100° and allowing the gas to mingle with 1 cu. m. of air, and the reagents and reaction products are then removed from the fabric.

103. Bleaching Cotton Piece Goods With Hydrogen Peroxide. R. E. Rupp. *Cotton* 99, 45-8 (Nov., 1935) *Chem. Abstracts* 1936. The bleaching of cotton piece goods with H_2O_2 is described. The preliminary alk. boil is shown to be of major importance. The bleaching depends further on the time, temp. and concns. of both H_2O_2 and alkali.

104. Treating Cotton Goods to Effect Bleaching, Etc. Wm. B. Pratt (to John Abbott, Everett D. Chadwick and Marcus B. May, as trustees) U. S. 2,040,795, May 12. Formaldehyde in aq. soln. is polymerized into a non-volatile, water-sol. aldehydic product, cotton goods are wet with the soln. thus prepd. and are then treated with an oxidizing bleach liquor. *Chem. Abstracts* 1936.

105. Aluminum (vessels) In Bleaching Processes With Hydrogen Peroxide. R. W. Muller. *Deut. Farber-Ztg.* 70,, 327-8 (1934) *Chem. Abstracts* 1935. In Al vessels aq. H_2O_2 lost only 4-5% of its O in 24 hrs. (approx. the same as in porcelain or glass).

106. Bleaching of Rayon. E. Klenk. *Kunsteide* 17, 179-80 (1935) *Chem. Abstracts* 1935. General information is given about the use of H_2O_2 as a bleaching agent for rayon. In comparison with Cl bleaches it is stated that the H_2O_2 bleach has better purifying action, gives an equal degree of whiteness and involves no danger of injury to rayon through the use of overconcns. of the agent.

107. Bleaching of Cotton. *Chem. Abstracts* 1935, p. 4954[1]. Bleaching cotton. Hugo Weiss and Ottmar Ritter von Reich. Fr. 778,616, Mar. 21, 1935. Cotton and like fibers are treated with an intensively acting bath, e.g., one contg. NaOH and a substance liberating O, with or without a stabilizer such as Na silicate, and then boiled. The boiling may be followed by a 2nd bleaching. Cf. *Chem. Abstracts* 29, 31766.

108, Bleaching Cotton. Hugo Weiss and Ottmar Ritter von Reich. Fr. 778,616, Mar. 21, 1935. *Chem. Abstracts* 1935. Cotton and like fibers are treated with an intensively acting bath, e.g., one containing NaOH and a substance liberating O, with or without a stabilizer such as Na silicate, and then boiled. The boiling may be

followed by a 2nd bleaching.

109. Bleaching Cotton, Etc. Hugo Weiss and Ottmas R. von Reich. Fr. 775,745, Jan. 8, 1935. *Chem. Abstracts* 1935. Textiles are treated with a bath acting in an intense manner, e.g., a bath containing caustic alkali and liberating O, before boiling. The boiling may be followed by a further bleaching.

110. The Decomposition of Hydrogen Peroxide in Alkaline Solution and Its Importance for the Bleaching of Cotton. Chr. Dorfelt. *Monatschr, Textil-Ind.* 50, 37-40, 67-70, 90-3, 117-19 (1935). *Chem. Abstracts* 1935. With increasing NaOH concn. of decompn. velocity of H_2O_2 reaches a max. at about 0.6 g. NaOH/1. at a temp. of 25° and a H_2O_2 concn. of 1.5 g./1. and then increases to a min. with rising temp. the max, is shifted to lower alkali concns. There is a const. molar ratio between NaOH and H_2O_2 at the max. decompn. velocity. With increasing concns. of Na silicate or pyroprosphate added as stabilizer, the decompn. velocity of H_2O_2 reaches a max. If the concn. of the stabilizer is kept const. and increasing amts. of NaOH are added the decompn. velocity increases continuously. Water glass is far superior to $Na_4P_2O_7$ as a stabilizer. Urea is unsuitable for the stabilization of H_2O_2 in the presence of NaOH. The decoction products of cotton are good stabilizers. The av. temp. coeff. of H_2O_2 decompn. velocity is 2.6 per 10°. In bleaching expts. on crude cotton yarn the H_2O_2 lost from the bleach by spontaneous decompn. with the evolution of O_2 was detd. gas-volumetrically; the concn. of H_2O_2 in the liquor was detd. by titration at the beginning and the end of the bleaching operation. Thus it was possible to calc. the H_2O_2 actually used for bleaching. The bleaching expts. showed in general the same dependence of the decompn. velocity of H_2O_2 on the addns. as was observed in the absence of cotton. The bleaching operation is best carried out by first treating the raw material briefly with NaOH and then adding H_2O_2. By this pretreatment the fiber is cleaned; but by swelling it is brought in the proper condition for the action of the H_2O_2; and the liquor is permeated by the decoction products of the cotton which decrease the decompn. velocity of H_2O_2: A good and economical bleach depends on certain alky. limits. Addn. of increasing amts. of water glass to liquors of low alky. (1, 2, 5 g. NaOH/1.) lowers the decompn. velocity of H_2O_2 and decrease the bleaching effect. With alkali concns. (10, 15, 20 g. NaOH/1.) the bleaching effect rises with increasing addns. of water glass; the H_2O_2 utilized for bleaching reaches its highest value with high NaOH concns. of the liquor and high addns. of water glass. This advantage, however, is accompanied by high gas losses and high consumption of chemicals. Prolongation of the bleaching time from 1 to 3 hrs. improves the bleaching effect but is accompanied by an appreciably higher gas loss, particularly with strongly alk. liquors. Several other patented methods are briefly described which can be used to lower the losses of H_2O_2 by the spontaneous decompn. in bleaching.

111. Washing Agents. H. Th. Bohme A.-G. Brit. 425,804, Mar. 21, 1935. *Chem. Abstracts* 1935. Oxidizing washing agents are prepd. by causing H_2O_2 or inorg. per salts to react with fatty alc. pyrophoric acid esters contg. at least 8 C atoms or with the reaction products of $Na_4P_2O_7$ with aliphatic alc. sulfuric esters contg. at least 8 C atoms. The products may be used for oxidizing and washing indanthrene dyeings and prints, degumming raw silk, pre-scouring cotton (semibleach), afterbleaching cotton after Cl bleaching and for decompg. starch. Among samples, (1) the mixt. of alcs. derived from coconut oil or myristyl acl. is esterfied with $H_4P_2O_7$, neutralized with NaOH and treated with H_2O_2, and (2) coconut alcs. after sulfonation with H_2SO_4 are treated with anhyd. $Na_4P_2O_7$ and the product is stirred into H_2O_2; the resulting paste may be dried.

112. Bleaching Plushes and Velvets-Silk and Rayon Mixture Fabrics. C. F. Eftonham. *Chem. Abstracts* 1935, *Silk J.* 12, No. 134, 23-4 (1935). H_2O_2 mixed with a little NH_3 or Na silicate, is principally used. This bath is tested for alky. and finally raised to 40°, SO_2 or $NaHSO_3$ in cold soln. may be also used, in which case there is no danger of the saponification of the rayon. $Na_2S_2O_4$ is used for tussah silks.

113. Textile Bleaching With Hydrogen peroxide. G. D. Pratt. *Can. Chem. Met.* 19, 196-7 (1935) *Chem. Abstracts* 1935. A brief review of stabilizers and assistants, equipment for bleaching, and trouble encountered in peroxide bleaching in work on the various textile fabrics.

114. Hydrogen Peroxide as a Bleaching Agent in the Textile Industry. Hans Riedl. *Chimica e industria (Brazil)* 3, No. 7, xc (1935) *Chem. Abstracts* 1935. Cl and chloramines are completely eliminated after the bleaching of cotton fiber by treatment with H_2O_2 in an alk. soln. at 70-90°.

115. Bleaching Agents, Hydrogen Peroxide As In Textile Industry. *Chem. Abstracts* 1935, p. 76671. Hydrogen Peroxide as a Bleaching Agent in the Textile Industry. Hans. Riedl, *Chemice e industria (Brazil)* 3, No. 7 xc (1935).—Cl and chloramines are completely eliminated after the bleaching of cotton fiber by treatment with H_2O_2 in an alk. soln. at 70-90°.

116. Bleaching of Textiles with H_2O_2, Review On. *Chem. Abstracts* 1935, p. 64324. Textile Bleaching with Hydrogen Peroxide. G. D. Pratt. *Can. Chem. Met.* 19, 196-7 (1935). —A brief review of stabilizers and assistants, equipment for bleaching, and troubles encountered in peroxide bleaching in work on the various textile fabrics. W. H. Boynton. Aluminum (Vessels) in Bleaching Processes with Hydrogen Peroxide. R. W. Müller. *Deut. Farber-Zig.* 70, 327-8 (1934).—In Al vessels aq. H_2O_2 lost only 4-5% of its O in 24 hrs. (approx. the same as in porcelain or glass).

117. Bleaching of Cotton, with H_2O_2 for Otaining Hydrophilic Cotton. *Chem. Abstracts* 1935, p. 52794. Boiling and Bleaching of Cotton by Hydrogen Peroxide for Obtaining Hydrophilic Cotton Without Boiling Under Pressure W. Fehre and M. Andoynand. *Arhiv. Hem. Farm.* 8, 179-84 (in French 184) (1934)—The process takes place in a slightly alk. medium in the presence of a very efficient wetting agent followed by 2-3 similar treatments in which the counter current principle is used.

118. Bleaching of Cotton, Etc. *Chem. Abstracts* 1935, p. 31766. Bleaching Cotton etc. Hugo Weiss and Ottmar R. von Reich. Fr. 775,745, Jan. 8, 1935. Textiles are treated with a bath acting in an intense manner, e.g., a bath contg. caustic alkali and liberating O before boiling. The boiling may be followed by a further bleaching.

119. Bleaching With Hydrogen Peroxide, Superoxides *and Per Salts. Chem. Abstracts* 1934, p. 69494. Hydrogen Peroxide, Superoxides and Per Salts, Their Preparation and Uses in Bleaching. A Bresser. Z *Ges. Textile-Ind.* 37, 354-6, 376-7 (1934).—The chemistry of H_2O_2, $NaBO_3$, NH_4BO_3, per carbonates, perphosphates and persilicates is discussed in relation to bleaching processes.

120. Bleaching of Textiles, In Open-Width Form. *Chem. Abstracts* 1934, p. 35991. Bleaching Fabrics in Open-Width Form. Frederick Barker, Ernest Barker and Percy V. Barker, U. S. 1,951,745, March 20. Various details of app. and operation are described. Bleaching Baths. Walter Fehre. Fr. 759,572, Feb. 5, 1934. The bleaching agent, e.g., aq. H_2O_2 is allowed to run off to regenerating vats which are then raised to a level at which the agent can run back to the bleaching vats.

121. Bleaching of Textiles, with H_2O_2 in Acid Baths. *Chem. Abstracts* 1934, p. 70291. Bleaching with Hydrogen Peroxide in Acid baths. A Molnar. *Monatschr. Textil-Ind.* 49, 18 (1934).—The bleaching is done best with the combined H_2O_2—Blankite I bleach. Stabilizers such as $Na_4P_2O_7$ are added to lower the rate of decompn. of the bleaching bath. Cu., Fe, Mo and W increase the rate of decompn. Bleachings can also be performed in acid baths if the time of exposure is pronlonged and the temp, is raised. In this way less O_2 is lost and the baths can be used continuously. The Pb vats can be covered on the inside with A1 or V2A steel or else several sheets of rust proof steel are suspended in the vats. This lowers the consumption of H_2O_2.

122. Hydrogen Peroxide, Bleaching Textiles With, *Chem. Abstracts* 1934, p. 7929 1,3. Stability of Hydrogen Peroxide Baths During the Bleaching of Various Fibers. Karl Lorenz. *Monetschr. Textil-Ind.* 49, 112 (1934).—The bleaching action of H_2O_2 depends on its property of liberating O_2 easily. Numerical results of tests are given showing the effect on the stability of H_2O_2 by changes in temp., acidity and alky. L. S. Oxygen Bleach. Erich Richter. Z *Ges Tetil-Ind.* 35, 100-1 (1932).—The preparation of the material for the bleach, the use of hot and cold bleaches with H_2O_2 and NaOCl, the action of active catalysts and the use of stabilizers for the H_2O_2 bath are discussed. The presence of Fe in the H_2O_2 is

unfavorable. The discussion is accompanied by curves and numerical examples.

123. Bleaching of Textiles. *Chem. Abstracts* 1934, p. 29234. Bleaching Textiles. Walther Huessy and Walther Krauer. Brit. 402,622, Dec. 7, 1933. The goods are boiled in a closed kier. The liquid withdrawn so as to expose them to steam action and the liquor then returned, said alternate treatment under const. pressures and temp. being repeated as often as desired. App. is described. Peroxide solutions, H. Th. Bohme, A.-G. Brit. 403,035, Dec. 14, 1933. Peroxide solns., especially for bleaching textiles, are stabilized against hardness and alkalies by adding alk. earth, Mg or Al salts of the sulfonation products of higher satd. or unsatd. alcs. Said salts also have a capillary action which results in more efficient bleaching action. Examples are given.

124. Bleaching With Hydrogen Peroxide. *Chem. Abstracts* 1934, p. 11939. Bleaching with Strongly Alkaline Hydrogen Peroxide, Walter Fehre. *Rev. Gen. Mat. Color.* 37, 466-7 (1933).—It has been found that different vegetable fibers require different alk. strengths for the best bleaching and that weak org. acids develop from these fibers during bleaching, weakening the desired alky. As a practical matter, it is recommended to bleacheries treating a variety of fibers to check the alky. at intervals, with phenolphthalein as indicator against 0.1 N oxalic acid and renew to the desired strength.

125. Bleaching of Cotton, *Chem. Abstracts* 1933, p. 4218. Latest Research Work Cotton Bleaching. Hugo Kauffman. *Am. Dyestuff Reptr.* 21, 647-9 (1932).—Hypochlorite bleaching depends upon the joint action of an oxidizing agent and activator. The oxidizing agent ordinarily is the ClO ion; the activator, HClO mols. The damage to fibers during bleaching is caused by the oxidizing agent. This action is inhibited by the activator. Suitable ClO activators are HClO, H_2O_2 NH_3, acid amides, amino acids, urea, dichlorourea and dimethylglyoxime. Optimal activation occurs between pH 7 and 8. In H_2O_2 bleaching the O ion is the oxidizing agent, the H_2O_2 mol. the activator. O_3 and ultra-violet light are not commercially satisfactory cotton-bleaching agents.

126. Bleaching of Textiles With Both Cl and H_2O_2. *Chem. Abstracts* 1933, p. 20393. Novelty in the Technique of Bleaching. G. Ghoisy. *Russa* 7, 1149, 1151 (1932); 8, 17, 19 (1933).—A brief description of Societe des Produits Peroxydes Fr. pat. 723, 798 (*Chem. Abstracts* 26, 4964) (pretreatment with Cl, insufficient to produce any bleaching effect, followed by alk. H_2O_2 bleaching), and of an app. devised by C. Maison for the H_2O_2 bleaching of textile and which can easily be adapted for mixed Cl-H_2O_2 bleaching.

127. Bleaching of Cotton, With H_2O_2. *Chem. Abstracts* 1933, p. 6061. Rational Bleaching (of Cotton) by Means of Hydrogen Peroxide. K. Aule. *Tiba* 10, 753-7 (1932).—A description of the app. designed and constructed by G. Mairesse, of the Office Textile, Paris, suitable for the bleaching of cotton by means of H_2O_2 or for mixed bleaching with H_2O_2 and Cl.

128. Bleaching of Cotton. *Chem. Abstracts* 1933, p. 38338. Bleaching Cotton. Hans. Kauffmann (to Buffalo Electro-Chemical Co.). U. S. 1,908,481, May 9. The material is treated with Cl water for a short time and then treated with an alk. soln. of H_2O_2.

129. Bleaching of Textiles, With Peroxides. *Chem. Abstracts*, 1933, p. 59019. Peroxide Bleaching. A Report of Progress. H. G. Smollens. *Am. Dyestuff Reptr.* 22, 600-2 (1933).

130. Hydrogen Peroxide, Bleaching With *Chem. Abstracts* 1933, p. 55464,5. The Hydrogen Peroxide Bleaching of Wool, Cotton and Silk. I. E. Weber. *J. Textile Inst.* 24, 178-93P (1933).—This paper includes a description of the methods of manuf.; definition of H_2O_2 strength; method for estg. H_2O_2 up to 30 vol. strength and for strengths greater than 30 vols.: data on stability of 12 vol. and 100 vol. strength H_2O_2; data on the effect of certain metallic salts on the stability of 10 vol. strength H_2O_2; history of bleaching with H_2O_2; description of steeping and aging processes; details regarding materials for plant construction; and detailed descriptions of the procedures for bleaching wool, silk, and cotton. Bleaching with Hydrogen Peroxide—the Modern Product in the Textile Trades. I. E. Weber. *Chem. Trade J.* 93, 153-5 (1933).—H_2O_2 produces a more permanent bleach than most other bleaching agents. An enhanced white is obtained in bleaching wool together with $Na_4P_2O_7$ and $Na_2C_2O_4$. This method is mainly applicable to the steeping process. Silicate with a Na_2O:3.2SiO_2 ratio is better than water glass or metasilicate.

131. Bleaching of Cotton Fabrics. W. H. Adams. *Chem. Abstracts* 1933, p. 40863 Modern Bleaching of Cotton Fabric. *Melliand Textile Monthly* 4, 663-5, 718-20 (1933).—A discussion of kiering processes and particularly of the peroxide bleaching method.

132. Hydrogen Peroxide Bleaching Textiles With. *Chem. Abstracts* 1933, p. 28169. The Use of Hydrogen Peroxide in the Textile Industry. Leo Kollmann. *Melliand Textilber.* 12, 637-8 (1931).—The H_2O_2 bleach in combination with the boil method of Ullman is of advantage with cotton goods. With wool the affinity for dyes is increased, more so by a preceding treatment with Cl.

133. Bleaching of Cotton. *Chem Abstracts* 1933, p. 25878. Bleaching Cotton. Deutsche Gold-Und Silber-Scheideanstalt Vorm. Roessles (Wilhelm Hundt, inventor). Ger. 570,022, August 12, 1926. Unbucked cotton is treated in turn with a reducing agent, e.g., SO_2 or $Na_2S_2O_4$, and an oxidizing agent, e.g., Na_2O_2 or H_2O_2.

134. Bleaching of Textiles, (Patents). *Chem. Abstracts* 1933, p. 8548. Bleaching Textiles. Bruno Reinhardt. Ger. 553,263, Feb. 18, 1930. Combination bleaching processes are carried out in closed vessels while applying pressure, e.g., 3-4 atm., during the last stage, or during all the stages if desired. An example is given. Cf. *Chem. Abstracts* 26, 2067. Apparatus for Bleaching Textiles with Ozone. Louis H. E. Begot. Fr. 733,048, May 8, 1931. Apparatus for Bleaching Textiles by Ozone. Compagnie de Blanchiment Electrique (Procede Crespi et Otto). Fr. 732,257, Apr. 29, 1931.

135. Bleaching of Fibrous and Textile Materials. *Chem. Abstracts* 1933, p. 12076. Bleaching Fibrous and Textile Materials. Elektrochem, Werke Munchen A.-G. Ger. 561, 481, Feb. 26, 1927. The materials are impregnated with a hot alk. soln. of H_2O_2 and left to stand under conditions which preclude evapn. and retard loss of heat. Alternatively, the materials may be impregnated with a cold alk. H_2O_2 soln., steamed, and then left to stand as before. The use of an excess of an alkali should be avoided.

136. Bleaching of Cotton, Piece Goods With Peroxide. *Chem. Abstracts* 1933, p. 8477. Peroxide Bleaching of Cotton Piece Goods. C. L. Eddy. *Am. Dyestuff Reptr.* 21, 725-6 (1932).

137. Bleaching of Textiles, With Peroxides. *Chem. Abstracts* 1933, p. 1947. Bleaching with Peroxides. P. W. Hargreaves. *Dyer* 68, 397-9, 453-4 (1932).—The following topics are discussed: bleaching plant for Na_2O_2 and H_2O_2; bleaching cotton, wool and linen with peroxide; sources of H_2O_2; testing liquors; and the use of Na perborate as a bleaching agent.

138. Bleaching of Textlies. *Chem. Abstracts* 1933, p. 41025. Bleaching Textiles. Raoul F. Favier. Fr. 744,291, Apr. 18, 1933. Baths contg. Na_2SiO_3 are used for dulling, and baths contg. Na_2SiO_3, and NaOH and H_2O_2 are used for desizing and bleaching viscose and acetate silk in the cold.

139. Bleaching of Textiles. *Chem. Abstracts* 1932, p. 33881. Bleaching Textiles. Soc. Des. Products Peroxides. Fr. 718,576, June 12, 1931. Vessels for use in bleaching textiles with peroxides are coated with a mixture of lime and cement to which MgO is preferably added.

140. Bleaching of Textile Materials. *Chem. Abstracts* 1932, p. 54356,7. Bleaching Textile Materials. G. Adolph. Brit. 351,217, June 5, 1930. Bleaching of materials, e.g., raw cotton is effected with H_2O_2 soln. of low concn. rendered slightly alk. and maintained at a temp. of (suitably) 80° to complete the bleaching while preventing substantial evapn. or radiation and without substantial addn. of liquor after a preliminary impregnation. Various details of procedure are given. Bleaching vegetable textile materials, H. O. Kauffmann and Electrochemische Werke Munchen A.-G. Brit. 352,690, June 18, 1930. The material is subjected to a pressure boiling with alkali followed by an open boil with H_2O_2 (both operations suitably being performed in an iron kier lined with a MgO—contg. cementitious material).

141. Bleaching of Textiles. *Chem. Abstracts* 1932, p. 20668. Bleaching Textiles. Wilhelm Francke. Fr. 712,010 June 6, 1930. Textile and fibrous materials are bleached by soaking or impregnation with a soln. sufficiently alk. and contg. H_2O_2, at a raised temp. and with

avoidance of all evapn. until the bleaching is complete.

142. BLEACHING OF TEXTILES. *Chem. Abstracts* 1932, p. 4964 2,3,4. BLEACHING TEXTILES. Soc. des Produits Peroxydes. Fr. 723,798, Oct. 2, 1931. Vegetable textiles such as cotton are treated with Cl gas in the presence of water, but not sufficiently long to cause any appreciable bleaching, and then are washed and bleached in a hot alk. bath contg. H_2O_2. Cf *Chem. Abstracts* 26, 3388. BLEACHING TEXTILES. D. G. Farbersind. A.-G. Fr. 39,696, Jan. 29, 1931. Addn. to 690,220 (*Chem. Abstracts* 25, 1103). The first and last steps (treatment with H_2O_2) of the process of Fr. 690,220 is suppressed, the first step being replaced by a boiling or steeping in a soln. of Na_2CO_3. A partially bleached product contg. no ligneous parts is obtained.

143. BLEACHING OF TEXTILES, ETC., COMPNS. FOR USE IN, *Chem. Abstracts* 1931, p. 25772. CLEANING TEXTILES, ETC. Louis A. H. Lantelme. Fr. 695,131, May 6, 1930. A colloidal product such as starch, paste, bone glue or skin glue is used in the cleaning, washing, bleaching, dyeing or charging of textiles or threads of all kinds. BLEACHING BAST FIBERS. I. G. Farbenind. A.-G. Brit. 339,550, March 16, 1929. Bast fibers, either as crude fiber or in yarn or finished goods, are bleached by successive use of baths comprising: (1) peroxide, (2) acid Cl soln., (3) Na_2CO_3 soln., (4) alk. or neutral Cl soln. and (5) peroxide. Various details are described.

144. BLEACHING, PEROXIDE. *Chem. Abstracts* 1931, p. 10882. SOME NOTES ON PEROXIDE BLEACHING. H. G. Smolens. *Am. Dyestuff Reptr.* 20, 4-6 (1931); cf. *Chem. Abstracts* 24, 5505. —Wool stock should be well scoured before bleaching. Wool piece goods are usually fulled after scouring, then washed, peroxide bleached by being run on an overhead reel through a bleaching soln. in a tub. Silk is bleached mostly in the form of piece goods, may be bleached on jigs, by immersion in stationary liquors in tubs, by padding and shelling and in continuous machines. Cotton stock is lightly peroxide bleached, usually in pressure machines as a prepn. for dyeing with vat colors. Cotton yarns are peroxide bleached in skeins, warps or packages. Cotton knit goods are handled in a manner similar to that of the yarns. The best bleaching of cotton piece goods is to prep, as for chemic bleach.

145. BLEACHING OF TEXTILES, WITH H_2O_2. *Chem. Abstracts* 1931, p. 55697. A NEW WETTING AND BLEACHING AGENT. M. Patard. *Tiba* 9, 867, 869 (1931).—Na isopropyl-naphthalenepersulfonate is a yellowish white powder, has an available O content equiv. to that of a 20% H_2O_2 soln., but is much more stable as it gives up its O very slowly in the presence of oxidizable substances; it has wetting, detergent and emulsifying properties equal to those of the best wetting agents and gives excellent results for boiling and desizing cotton. A Na aliphatic perfulfonate (exact nature not disclosed) has also been obtained which gives perfect desizing of rayon.

146. BLEACHING TEXTILES WITH HYDROGEN PEROXIDE. *Chem. Abstracts* 1931, p. 55697. LATEST PROGRESS IN THE BLEACHING OF TEXTILES WITH HYDROGEN PEROXIDE. E. Billot-Mornet. *Tiba* 9, 745-53 (1931.—An address.

147. BLEACHING PEROXIDE. *Chem. Abstracts*, 1931, p. 57742. BLEACHING DELICATE FIBERS. Fred. Grove-Palmer. *Silk J.* 7, 80, 26 (1931).—The goods are bleached for 30 to 40 hrs. by exposure to the vapors evolved by heating a 30% H_2O_2 soln. to 50°, while the vol. is kept const. by adding H_2O.

148. BLEACHING WITH 100 VOL. HYDROGEN PEROXIDE. *Chem. Abstracts* 1931, p. 57742. BLEACHING WITH ONE HUNDRED VOLUME HYDROGEN PEROXIDE. D. S. Quern *Am. Dyestuff Reptr.* 20, 529-31 (1931).—General.

149. BLEACHING WITH PEROXIDES. *Chem. Abstracts* 1930, p. 26168. BLEACHING TEXTILE MATERIALS WITH PEROXIDES. Deutsche Gold-und Silber-Scheideanstalt, Vorm. Roessler. Brit. 320,072, July 3, 1928. Bleaching with peroxides while employing liquid currents which pass in different directions is carried out in vessels formed from or lined with cement or like hydraulic mortars. An iron vessel may be coated with a suspension of cement in water with addn. of Na silicate to the mixt. and subsequent application of Na silicate to the coating after it is applied. Structural features of app. are described.

150. BLEACHING OF COTTON WITH H_2O_2. *Chem. Abstracts* 1930, p. 22997. BLEACHING WITH HYDROGEN PEROXIDE. H. G. Smolens. *Am. Dyestuff Reptr.* 18, 797-805 (1929); cf. *Chem. Abstracts* 23, 2574.—A general discussion of methods for bleaching the cotton textile fibers with H_2O_2.

151. PEROXIDE BLEACHING IN IRON KIERS. *Chem. Abstracts* 1930, p. 60261. PEROXIDE BLEACHING IN IRON KIERS. Hans O. Kauffmann. *Melliand Textilber.* 11, 372-6 (1930).—If an iron kier is properly protected by allowing a coating of lime and portland cement to harden, and then boiling in it a soln. of $NaSiO_3$ and Na_2CO_3, it can be used for H_2O_2 bleaching. The wetted-out goods are plaited in the kier in the usual manner and the peroxide soln. is added cold. With const. circulation the temp. is raised to 95°, and the circulation is continued until the decrease in alky. and activeO content practically ceases.

152. BLEACHING OF COTTON WITH H_2O_2. *Chem. Abstracts* 1930, p. 55056. KIER BLEACHING COTTON GOODS WITH HYDROGEN PEROXIDE. H. G. Smolens. *Am. Dyestuff Reptr.* 19, 351-3 (1930); cf. *Chem. Abstracts* 23, 2574, 2575.—Steam injector kiers may be used for peroxide bleach boiling. Boiling solns. of strongly alk. peroxide bleach cotton in steel kiers. If a stable peroxide is used, the kier boiling liquor retains its bleaching strength beyond that used up in bleaching the cloth. The decrease in peroxide concn. is proportional to the amt. of bleaching if the drop in total alky. is correlative.

153. PEROXIDES FOR BLEACHING OF TEXTILES. *Chem. Abstracts* 1929, p. 2817. PEROXIDES FOR TEXTILE BLEACHING. THEIR PAST, PRESENT AND PROBABLE FUTURE. H. G. Smolens. *Am. Dyestuff Rept.* 17, 672-4, 678 (1928).—Bleaching with Cl and with peroxides are compared especially with reference to the recently developed electrolytic 100 vol. H_2O_2 soln. Although the chem. cost of peroxide is higher than that of Cl, the use of the 100 vol. peroxide is easier, safer and healthier to apply. to cotton as compared with any form of Cl. Also, the 100 vol. peroxide bleach is followed by less shrinkage and less loss of wt. Its advantages tend to overcome the greater chem. cost. The Na_2O_2 bleach is not recommended.

154. BLEACHING WITH HYDROGEN PEROXIDE. *Chem. Abstracts* 1929, p. 25751. BLEACHING COTTON GOODS IN KIERS WITH HYDROGEN PEROXIDE. H. G. Smolens. *Am. Dyestuff Reptr.* 18, 11-5 (1929).—Factors involved in the kier bleaching of cotton with H_2O_2 by the one-boil and two-boil bleach processes are discussed.

155. BLEACHING OF COTTON. *Chemist Abstracts* 1929, p. 3580 5,6. KIER-BLEACHING COTTON WITH PEROXIDES. T. E. Bell. *Am. Dyestuff Reptr.* 18, 293-5 (1929).—Application and control of proper chemicals to the particular fabric as well as mech. details are essential to efficient kier-bleaching of cotton with peroxides. H. Leupold.

156. BLEACHING PEROXIDE, HALF A CENTURY OF, *Chem. Abstracts* 1929, p. 20384. HALF CENTURY OF PEROXIDE BLEACHING. Geo. W. Kuchler. Roessler & Hasslacher Chemical Co. *Textile Colorist*, 50th Anniversary (1879-1928), 84, 124.—A review.

157. BLEACHING WITH SODIUM PERBORATE. *Chem. Abstracts* 1928, p. 39936. THE USE OF SODIUM PERBORATE IN THE TEXTILE INDUSTRY. *R. Tiba* 6, 427, 429, 525, 527, 663, 665 (1928). —Brief practical operating hints on the methods of using $NaBO_3$ in bleaching and dyeing different classes of textiles, with an outline of miscellaneous uses to which it can be put, such as laundering, prepn. of weak H_2O_2 solns. for household use, removal of stains, bleaching of toilet soaps, prepn. of cotton sizing.

158. BLEACHING WITH HYDROGEN PEROXIDE. *Chem. Abstracts* 1927, p. 37486. BLEACHING WITH HYDROGEN PEROXIDE. H. G. Smolens. *Am. Dyestuff Reptr.* 16, 545-9 (1927). Seven specifications of H_2O_2 for bleaching are stated. Since H_2O_2 may act as a reducing agent in acid solns. and thereby cause many undesirable reactions to the injury of the goods, it is necessary that the bath be kept continuously alk. Five specifications of the alkali are given, the choice of alkali depending to some extent on the acid present with the H_2O_2. During bleaching the bath must be controlled from time to time so that the alkali does not combine chemically or act physically on the material being bleached. Directions are given for the avoidance of underbleaching, overbleaching, harshness and spoilage.

159. BLEACHING WITH CHLORAMINE G (ACTIVIN). *Chem. Abstracts* 1927, p. 6533. ACTIVIN —A NEW PRODUCT FOR THE TEXTILE INDUSTRY. A. J. Hall, *Dyer; Calico Printer* 56, 150-1 (1926).—Activin is an oxidizing agent of much greater stability than Na_2O_2, perborate, or H_2O_2. Its compn., properties and uses in bleaching, desizing and the prepn. of sizes and finishing materials are discussed. Chas. E. Mullin.

160. Bleaching with Peroxides. *Chem. Abstracts* 1926, p. 17206. T. D. Ainslie. *Am. Dyestuff Reptr.* 15, 203-9 (1926).

161. Bleaching of Textile Fibrous Materials by Means of Oxygen Compounds. W. E. Hadley. *Am. Dyestuff Reptr.* 7, 29-30 (Sept. 1920).— Cl may be used to bleach cotton or linen but goods consisting partly or entirely of silk or wool fibers are injured by Cl and must be bleached by other agents. The O compds. most in use are Na_2O_2, H_2O_2 and $NaBO_3$, though the latter being more expensive is found in laundry prepns. nor used for bleaching in general. To bleach properly, Na_2O_2 or H_2O_2 must be controlled so that O is slowly and steadily liberated throughout the entire material being bleached. This liberation is hastened by raising and retarded by lowering the temp. An alk. condition favors the evolution of O while an acid reaction retards it. To make about 100 gal. Na_2O_2 bath, 2.75 lbs. oil of vitriol should be added to 100 gal. water and well mixed; then Na_2O_2 is slowly added with stirring until the bath is neutral—about 2 lbs. are needed; 4 lbs. Na_2SiO_3, somewhat dild., is then added when the reaction becomes alk. Cotton material may be bleached in this bath by keeping the temp. just below the boil for one hr. The bath for woolen fibers should contain 5.5 lbs. of vitriol 4 lbs. Na_2O_2 and 2 lbs. Na_3PO_4 to 100 gal. The temp. should not be above 60°, and the bleaching may progress until the desired shade is obtained. Silk requires a somewhat stronger bath than wool and its alkalinity is obtained by the addition of Na_2SiO_3. The temp. may be higher than that used for wool. The used bath may be replenished and used repeatedy. If allowed to stand between periods of use it must be made slightly acid with H_2SO_4 to prevent decompn. A bleach bath with Na_2O_2 or H_2O_2 must possess the same percentage of available O regardless of the quantity of material being bleached. Bleaching is best carried out in wooden vats. Material bleached by O has remarkable softness, elasticity, brilliancy, strength and life, and a permanent white is obtained.

162. Bleaching, Washing and Dyeing. J. F. King. Brit. 146,078, Feb. 20, 1920. Textile materials and articles are bleached to a "dead white" by immersing them in a vat in a soln. containing NaCl and adding a peroxide, such as H_2O_2 or Na_2O_2 and Na_2SO_4. The contents of the vat are boiled and then the materials are rinsed in hot and cold H_2O successively. If the materials are to be dyed a H_2O soln. of a dye paste such as of "sky-blue" dye is added to the cold H_2O rinse and the materials are allowed to stand for about 5 min. The contents of the vat are then heated to about 130°F. and left for a period sufficient to produce the desired shade.

163. Peroxide Bleaching. Albert Berger. *Textile Colorist* 41, 282-5, 340 (1919).—The reagents used are H_2O_2, Na_2O_2 or $NaBO_3.H_2O$. The necessary equipment and prepn. of the bath are described.

164. Bleaching Textile Fibers. A Schaidhauf. U. S. 1,278,389, Sept. 10, 1918. In bleaching Macco yarn or other textile fiber by means of alk. H_2O_2 solns. stabilized by anticatalyzers, effects equal to those produced by Cl are stated to be obtained if 2 successive baths are used, each of which is heated to about 87° from the very beginning of the bleaching operations and allowed to act on the goods for 2 hrs. A bath for use in this manner may, e.g. be formed of 0.28% Na_2O_2, Na silicate 0.025%, 0.02% $MgCl_2$ and 0.07% Monopol soap. This treatment is stated to give better results than an otherwise similar treatment in which the bath is maintained at a somewhat lower temp. at the beginning of the treatment.

165. Bleaching Textile Fibers. A Schaidhauf. U. S. 1,235,929 Aug. 7, 1917. Cotton or other similar textile fiber is bleached by a soln. of caustic alkali and H_2O_2 containing $MgCl_2$ or other sol. Mg. compd. which acts as an anticatalyzer in preventing too rapid decomposition of the H_2O_2 and also prevents decompn. of the fiber by the caustic alkali.

166. Textile Fibers, J. Meister. *Swiss* 71, 791, July 17, 1916. The crude fibers are subjected to a preliminary treatment in a dil. acid bath, and then to a treatment with a weak-acid enzyme soln. which contains H_2O_2. Technical enzyme prepns. produced by bacteria cultures are used. The product is finally rinsed.

167. Fireproofing and Bleaching Textile Fabrics. T. J. I. Craig. U. S. 1,224,145, May 1, 1916. Cotton cloth or other textile fabrics are rendered resistant to fire and are bleached by successively treating with Na aluminate soln., drying, applying CO_2, treating with a soln. of $NaHCO_3$ and again treating the wetted fabric with CO_2 and finally applying a soln. of H_2O_2 or other bleaching agent.

168. Bleaching. Deutsche Gold- und Silber-Scheideanstalt Verm. Roessler Brit. 10,916, July 27, 1915. In bleaching cotton, etc. with solns. of alkali peroxides containing "stabilizing catalyzers," such as stannic acid, colophony, dextrin, gelatin, or a mixt. of Na_2SiO_3 and $MgCl_2$, the bleaching bath is maintained at its maximum temp. during the whole bleaching process.

169. Replacing Chlorine Bleaches With Oxygen Bleaches. W. Kind. *Farber-Ztg.*, 25, 93-5.—Processes based upon published formulas for the use of peroxides and persalts, especially perborates, give insufficient bleaching or are far too expensive to compete with the usual hypochlorite processes. These substances promise to be of use only in special cases: bleaching prints and goods with white ground; bleaching and simultaneously removing sizing from heavy materials, such as ribbed goods; and rebleaching linen.

170. Prevention of Decomposition of Peroxide Bleaching Baths. V. Wintsch. *Rev. Mens. Blanchissage* 7, 102 (1914); *J. Soc. Chem. Ind.* 34,, 349.—Alk. solns. of H_2O_2 and other bleaching agents containing active O, are rendered stable by the addition of B compds. and pyrophosphates. These additions are also useful for the preservation of neutral or acid bleaching baths.

171. Fireproofing; Bleaching. T. J. I. Craig and Whipp Bros. & Tod. Brit. 22,617, Nov. 17, 1914. Unbleached or partly colored unbleached textile fabrics, etc., are first fireproofed by treatment with alkali aluminate then with alkali bicarbonate and CO_2 (Brit. 16, 153, 1914) and then bleached; when treating uncolored fabrics or partly colored fabrics dyed with dyes unaffected by hypochlorite. NaOCl is suitable, or when treating partly colored fabrics dyed with dye affected by hypochlorite, H_2O_2 soln. is suitable. Alk. bicarbonate is preferably added to bleaching solns.

172. Ger., 279,863, Aug. 1, 1912. L. Golodetz and B. Benedix. Hastening the bleaching action of H_2O_2 or other peroxides or persalts by impregnating the fabric with enzymes, such as oxydases, and then bringing it into contact with the soln. of the O carrier. The organic ferments appear to act in some manner on the fiber to open it up. Plant exts. are suitable as enzymes, such as aq. alc. exts. of horse-radish, and the like. Yeast and yeast exts. may also be employed.

173. Ger. 270,703, Mar. 31, 1911. H. Byk. Bleaching vegetable fiber and the like with sep. treatment of the material with H_2O_2 and NH_3.

174. U. S. 941,158, Nov. 23. Paul Mausolff, Frankfort a/M, Germany. Assigned to Roessler & Hasslacher Chemical Co., New York, N. Y. Washing, cleaning and bleaching composition. Na perborate or other similarly acting "peroxidized compound" 80-90, soda 5-10 and borax 5-10 parts.

175. Brit. 19,776, Aug. 28, 1909. Andre Margotin, 13 rue des Trois Raisinets, Reims, France. In the bleaching of fabrics, threads, and other fibrous material, subjecting the material to the action of $KMnO_4$, H_2O_2 or other peroxide, introducing SO_2 into a tank or digester containing under vacuum the material treated as aforesaid, and expelling said acid, by the injection of compressed air, to a vessel containing H_2O or an alkaline earth soln.

176. Ger., 256,997, May 11, 1909. H. Siebold. In the bleaching of textile materials by means of H_2O_2, the bleaching bath is not rendered alk. by NH_3 or the like, but a dil. H_2O_2 soln. is used as the bleaching liquid, the material is satd. with this soln. then wrung out, and then introduced into a chamber filled with NH_3. Further details specified.

177. Ger. 228,081, Dec. 25, 1909. Emil Scheitlin, Zurich. For the manuf. of a washing and bleaching agent from alkali peroxide which is easily handled, which no longer has the undesirable properties of the peroxide, and which may be gelatinized by the addition of organic solvents as by combining the peroxides with resins. The resulting mixts. are stable to the moisture of the air and may be readily transported. By the process of gelatinization it is possible to obtain a product which is decomposed by H_2O only above 80°.

178. Ger. 190,140, Dec. 29, 1906. Max Haase, Berlin. An alkali peroxide cartridge for cleansing purposes, prepared by filling a stearin container

with Na_2O_2, sealing in a stearin stopper by fusion, and encasing the whole in a soap jacket. Upon introducing into hot water the soap and stearin melt, the peroxide yields O as a bleaching agent, and the NaOH formed saponifies the stearin.

179. Brit., 23,725, Nov. 5, 1908. Fritz Gallati-Grob. Luchsingen, Kanton Glarus, Switzerland. Producing a fluid washing and bleaching medium in which Na_2O_2 is dissolved in H_2O and powdered H_2O_2 is added to the sol.

180. Fr., 382,144, Sept. 23, 1907. Jaloux, Tarn, France. In the bleaching of textiles employing two successive baths: (1) glycerol 1% of the weight of the goods, Na_4SiO_4 2.5% and Ba_2O_2 2%, com. H_2O_2 10 l., adding water in sufficient quantity and heating to 45°, immersion 1 hour; (2) HCl 3% of the weight of the goods, H_2O at 35° in sufficient quantity, immersion one-half hour.

(To be continued)

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information from the Secretary.

50-26

Education: B.S. in Textile Chemistry & Dyeing.

Experience: Textile chemist and colorist.

Age 33; married; references; southern New England preferred.

10-2, 10-16

50-27

Education: B.T.E., Georgia Institute of Technology.

Experience: Second hand in bleachery.

Age 26; married, references; South preferred.

10-2, 10-16

50-28

Education: Textile Chemistry and Dyeing, evening textile school following high school.

Experience: Overseer of dyeing, mainly on wool, piece and stock.

Age 37; married; references; New England preferred.

10-2, 10-16

Aging—

(Concluded from Page P698)

more acid and had higher fluidity than those under SLATS, an observation that is contrary to what had been expected.

5. An interesting observation is that there appears to be a pattern of degradation in storage. For all forms of exposure, the deterioration is greater during the initial four-month than in the second-four-month periods. The fact that the values for COVER, SLAT, and SUN exposures for fluidity and breaking-strength loss appear to approach an asymptote indicates that the rate of deterioriation decreases in respect to time.

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Mid-West Section to Meet Oct. 28

THE Autumn Meeting of the Mid-West Section will be held at the Morrison Hotel, Chicago, Illinois, on Saturday, the 28th of October at which time the Annual Election of officers will also be held.

A surprise program has been planned for the afternoon session. Dinner will be served promptly at 7:00 p.m.

The evening program will be presented by the E. I. duPont de Nemours & Company. Dr. Paul L. Meunier, manager of Sales Development for their Organic Chemicals Department, will give a talk entitled "The Dyeing of New Synthetic Fibers."

CALENDAR

GENERAL RESEARCH COMMITTEE
November 17, 1950 (Hotel Commodore, New York); January 19, 1951 (Hotel Commodore, New York); April 20, 1951 (Raleigh, N. C.); June 15, 1951 (Hotel New Yorker, New York); October 18, 1951 (Hotel Statler, New York); November 16, 1951 (Hotel New Yorker, New York).

COUNCIL
November 17, 1950 (Hotel Commodore, New York); January 19, 1951 (Hotel Commodore, New York); April 20, 1951 (Raleigh, N. C.); June 15, 1951 (Hotel New Yorker, New York); October 18, 1951 (Hotel Statler, New York); November 16, 1951 (Hotel New Yorker, New York).

NATIONAL CONVENTIONS
1951: October 17-18-19, Statler, New York.
1952: Boston.

HUDSON-MOHAWK SECTION
Meetings: Oct. 20 (Utica), Dec. 8 (Albany), Jan. 19, 1951 (Albany), Mar. 16, 1951 (Albany), May 11, 1951 (Albany), June 22, 1951 (Annual Outing).

MID-WEST SECTION
Meetings: October 28, 1950, February 3, 1951 (Morrison Hotel, Chicago), May 5, 1951 (Hotel Schroeder, Milwaukee), June 16, 1951 (Outing, Lake Lawn Lodge, Delavan, Wis.).

NEW YORK SECTION
Meetings: November 17 (Swiss Chalet), Jan. 12, 1951 (Hotel New Yorker), Feb. 23, 1951 (Hotel New Yorker), March 30, 1951 (Swiss Chalet), May 4, 1951 (Swiss Chalet), June 15, 1951 (Outing).

PACIFIC SOUTHWEST SECTION
Meeting: October 27 (Mayfair Hotel, Los Angeles, Cal.)

PHILADELPHIA SECTION
Meetings: October 28 (Meeting-in-Miniature, Philadelphia Textile Institute), December 8, January 19, 1951.

PIEDMONT SECTION
Meeting: October 28 (Charlotte, N. C.)

PUBLICATIONS COMMITTEE
November 16, 1950 (Hotel Commodore, New York); January 18, 1951 (Hotel Commodore, New York).

RESEARCH COMMITTEE
Meeting: Nov. 17 (New York).

RHODE ISLAND SECTION
Meetings: October 27 (Providence Engineering Society Hall), November 17 (Johnson's Commodore Room).

SOUTH CENTRAL SECTION
Meeting: Nov. 4 (Hotel Patten, Chattanooga, Tenn.).

SOUTHEASTERN SECTION
Meeting: December 9 (Atlanta, Ga.).

WESTERN NEW ENGLAND SECTION
Meetings: Nov. 3 (Shelton), Dec. 15 (Shelton), Jan. 26, 1951, March 16, 1951, May 4, 1951, June 23, 1951 (Outing).

NEWS

VOLUME 39 OCTOBER 16, 1950 NUMBER 21

E. MacKenzie Maxwell

• National Aniline Names New Top Executives

E. M. Maxwell and D. G. Rogers have been appointed President and Executive Vice-President respectively of the National Aniline Division of Allied Chemical & Dye Corporation, New York. Both men were formerly vice-presidents with the company and have served in various executive capacities.

Mr. Maxwell succeeds B. A. Ludwig, Dean of the American dyestuff industry who retired on Oct. 1st after 53 years service with the company and its predecessors.

D. G. Rogers

• Winthrop-Stearns Moves Executive Offices

Winthrop Stearns, Inc. has announced the removal of its executive offices from 170 Varick St., New York 13, N. Y. to 1450 Broadway, New York 18, N. Y.

• Huge Monsanto Expansion Program

An expansion program for Monsanto Chemical Company at its Texas City, Texas operations, totaling in all its ramifications approximately $30,000,000 over the next few years, has been announced by William M. Rand, Monsanto president. The new program is reported to involve chiefly the production of acrylonitrile and related chemicals by a process direct from acetylene.

Construction of new facilities is expected to begin immediately at the present styrene manufacturing location at the company's Texas City plant. It is stated that upon completion these facilities will nearly double the size of the present plant, which was rebuilt after almost total destruction in the Texas City disaster of April, 1947.

The expanded facilities will operate under the present plant management, headed by Joseph R. Mares, Monsanto vice president and general manager of the company's Texas Division, in line with the company's building up its Texas operations.

No figures were announced concerning the number of employees of capacity of the new production facilities but it is stated that when fully completed they will more than double the company's investment at Texas City.

• New N.Y.B.T. Magazine

"Business Speaks", a 20-page monthly publication without advertising will soon be issued to the membership of the New York Board of Trade. William T. Van Atten, president of the Board, said that the magazine takes its name from the Board's monthly bulletin, now discontinuel. In its new format, with added departments and feature articles, the magazine will aim at more extensive coverage of current news and activities of the Board.

Alexander D. Stanley heads the editorial board as editor-in-chief with Carlton Short as editor. Contributing editors include: Arthur Lutz, G. A. Buckingham, A. J. Barnaud, Helen L. Booth and Howard S. Zoll, art director.

• ACC Awards Fellowships at 14 Colleges

American Cyanamid Company has granted thirteen post graduate fellowships and one post doctoral fellowship in the fields of chemistry and chemical engineering for the academic year 1950-51. Each post graduate fellowship provides $1200 for the student, plus $300 or the student's full tuition whichever is larger. The post doctoral fellowship carries a stipend of $3000 for the recipient.

Fellowships have been awarded for the 1950-51 academic year to the following universities: Carnegie Institute of Technology, University of Colorado, Columbia University, Cornell University, Duke University, University of Illinois, Massachusetts Institute of Technology, University of Michigan, University of Notre Dame, Pennsylvania State College, Princeton University, Purdue University, Stanford University and the University of Wisconsin.

• LTIES Sponsors Industrial Clinic

The Engineering Society of Lowell Textile Institute is sponsoring an Industrial Clinic to be held at the Institute on Saturday, October 28.

Aim of the clinic is to present to the members of management in the textile and allied fields the latest innovations and future possibilities pertinent to their operations.

Richard Sumner, Manager of the Textile Resin Department of the American Cyanamid Company will speak on "Resin Finishes," and Reverend Thomas E. Shortell, S.J., of Boston College will talk on "Labor Management Problems."

Following a discussion period, Nathaniel Barnes, President of the Barnes Textile Associates, will give an address on "Material Handling," and Colonel I. M. Bethel, U.S.M.C., who is Contracting Officer for the Marine Corps Washington Headquarters, will speak on "Military Requirements of Textiles."

Committee Chairmen for the Clinic, first of its kind to be sponsored by the Engineering Society at the Institute, are Philip W. Haley, Arthur J. Weldon and Dorrance H. Goodwin. Serving on the Advisory Committee are President Martin J. Lydon, Dean of Faculty G. Nathan Reed, and Professors Herbert J. Ball, James H. Kennedy, Jr., Gilbert H. Merrill, and Chapin A. Harris.

NEW PRODUCTS

AO Spencer Photomicrographic Camera

• New Series of Photomicrographic Cameras

The American Optical Company Instrument Division, Buffalo, N. Y., has announced a new series of AO Spencer 35mm. and 4"x5" photomicrographic cameras to replace a line discontinued during the war. The models offered include a 4 x 5 camera and 35mm. film camera, both with Universal shutter and telescopic focusing eyepiece, and a 4 x 5 camera with Alphax shutter. The 35mm. camera is interchangeable with the 4"x5" body and is equipped with a compensating lens to accommodate the difference in focal lengths. Holders are available for 4"x5" plates, films, or film packs. Reducing adapters are available for 3¼" x 4" or 3¼" x 4¼" film and for 3¼" x 4" plates.

Features of the new series include:

(a) a unique revolving body which permits 360° rotation of the camera backs. This is said to eliminate the circular revolving stage.

(b) a light-tight adapter which permits swinging the camera over or away from the microscope without raising or lowering the camera body or disturbing the focus.

(c) a fine adjustment stop on the camera arm for precise repeat positioning and faster operation.

(d) a telescopic focusing eyepiece with cross-hair reticule for critically sharp focusing—the 4" x 5" ground glass has diagonal transparent strips across the field enabling use of a magnifier to check quality of the image when super critical focusing over the entire plate arm is essential—(image may be viewed in the telescope up to the moment the shutter is released).

(e) four positioning clamps on the base plate.

(f) four adjustable rubber vibration absorbers.

• Lubriknit W

An oil finish that can be applied directly in a hot dye bath has been devised by the Kearney Manufacturing Company, Kearny, N. J., under the trade name, "Lubriknit W." The product is designed for the skein dyer of woolen, worsted and hair yarns.

Kearny recommends the use of 1 to 2% Lubriknit W based on the weight of the yarn. Since Lubriknit emulsion is exhausted from an acid dye bath in 5 or 10 minutes at a temperature above 160° F., the product can be added towards the end of the dyeing procedure, it is stated. Hussong or Klauder-Weldon equipment can be used, and the weight of the dyed skeins will be greater due to the substantivity of the finish, the company states.

Other reported features of Lubriknit W are the following:

(a) Waxing is eliminated in winding operations since the skeins carry the lubricant to the dyebath.

(b) Finish is superior because it is evenly applied to *all* fibers.

(c) Additional waxing on knitting machines is not required.

(d) Less fly accumulates in winding and knitting rooms.

The product is said to be stable to light and oxidation. It does not change the color of the dyed skeins and does not become rancid on aging, the company states. They further state that since Lubriknit K can be used in the boiling dye bath, matching of the colors can easily be accomplished without interference. Literature is available from Kearny upon request.

• Scetol

Scetol, a blend of organic derivatives derived from the extracts of various vegetable materials, is finding use in the dyestuff industry as a solvent, an intermediate and as a dispersing agent. The pale yellow-red aromatic liquid produced by Process Chemical Specialties, Beverly, Mass., may also serve as an odor masking agent and preservative, it is stated. It is also stated that textiles, paper, leather and ceramics are impregnated with Scetol, and subsequently treated with catalyst producing resins in situ. Scetol can be emulsified and polymerized in situ as well, it is reported.

The product reportedly gives no ash on ignition, has a B. P. range of 160-215° C., a flash point approx. 150° F. and a trace of moisture. It is said to solidify below 0° F., is soluble in water at 4% and most organic solvents, and weighs approximately 8.6 lbs. per gal.

Among the products resulting from various chemical reactions involving Scetol are printing inks, dyes, textile impregnants, etc. The price is listed at 28c/lb. for a 55 gal. drum, F.O.B. Beverly.

• Filter Pump Model LSI-10

Sethco, 105-07 150th St., Jamaica 4, N. Y., has announced a new model filter pump known as Model LSI-10, equipped with a high temperature lucite filter cylinder and a stainless steel pump, and rated at 100 gallons per hour.

The company lists the following advantages of filtering with lucite filter cylinder pump units:

(1) Complete resistance to all electroplating solutions and industrial solutions.

(2) High temperature solutions up to 200°F. filtered with complete safety.

(3) Simple operation.

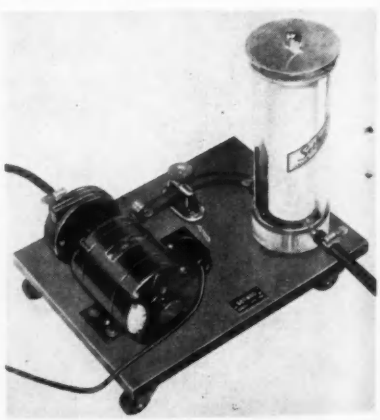
(4) No loss of expensive solutions.

(5) Filter tube can be backwashed or washed. The filter element is a specially processed cotton yarn wound around a stainless steel supporting core.

(6) Crystal clear filtration.

(7) Visual advantage—transparent lucite cylinder.

The filter cylinder, of transparent lucite, holds less than one quart of solution. The filter element is a specially processed cotton yarn, densely wound around a stainless steel supporting core. It is reported very durable.



Sethco LSI-10 Filter Pump

PERSONNEL

Dr. B. K. Vaidya, Assistant Director, Ahmedabad Textile Industry's Research Association, Ahmedabad, India (left), and Dr. John D. Guthrie, Section Head of the Cotton Chemical Processing Division, Southern Regional Research Laboratory, discuss new types of chemically modified cotton fabrics developed by the U. S. Department of Agriculture in New Orleans, Louisiana. Dr. Vaidya visited the USDA Laboratory September 19-20, 1950, following visits to a number of other textile research laboratories in both the United States and Europe during recent months. On his return to India he will assist in organizing a laboratory to serve the Ahmedabad textile industry.

ALEXANDER J. WUERTZ, a Du Pont chemist, has retired after more than 31 years with the company. He has taken charge of the plant safety program of the Manufacturing Chemists Association with headquarters in Washington.

Mr. Wuertz went with Du Pont in 1919 following his graduation from the University of Nebraska in 1916, a year's fellowship in biological chemistry at the University of Minnesota, and two years as a faculty member at Iowa State College. For nearly a decade he was associated with the company's pioneering work in developing dye-making processes at the Organic Chemicals Department's Jackson Laboratory at Deepwater Point, N. J.

In 1931, he transferred to the laboratory the company then operated at Carrollville, Wis., and for nearly five years was assistant director and acting director there. He returned to the Jackson Laboratory in 1938 and for a number of years held a variety of administrative positions. At the time of his retirement July 31, he was a technical assistant in the department's Wilmington headquarters.

With the division of the Research and Development Department of Alexander Smith & Sons Carpet Company into seven major divisions, several organization and personnel changes have been announced by A. G. Ashcroft, department director.

LEO W. RAINARD, who has been in charge of the Chemical Research Division, has been promoted to Assistant Director of Research. Mr. Rainard, an M.I.T. graduate has been with the company since 1947. He has previously been with Atlantic Research Associates, General Latex, and the Institute of Textile Technology.

EDMUND A. LEONARD replaces O. P. BECKWITH as manager of the Technical Laboratories Division. Mr. Beckwith is now Assistant Director of the Quality Control Department—a newly organized department. Mr. Leonard started with the original Product Engineering Laboratories in 1941 following his graduation from Columbia University. He is an active AATCC member.

GEORGE N. DREISCH, a newcomer with the company, replaces J. H. PFAU, who has resigned as Manager of the Mechanical Research Division. He is a graduate of Baltimore Polytechnic Institute and has been a chief engineer with the Industro-Matic Corporation, the Center-Line Corporation and Rogers' Diesel and Aircraft.

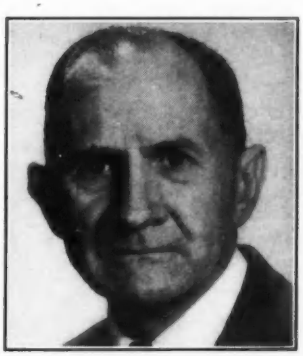
JOSEPH L. BARACH will continue as Manager of the Physical Research Division. EMORY P. MERSEREAU will supervise the Chemical Research, and ALLEN R. WINCH has been appointed supervisor of the Analytical Section of the Technical Laboratories Division, having been acting head of the section for several months. Mr. Winch started with the company in 1948. He also is a Columbia graduate.

Claude O. Witze

CLAUDE O. WITZE, formerly of the Providence Journal, has been appointed industrial and public relations manager for Synthron, Inc., manufacturing chemists, Ashton, R. I. Mr. Witze, a Columbia University graduate, has had 17 years in the newspaper field.

MAJOR GENERAL ALDEN H. WAITT (Ret.), former chief of the Chemical Warfare Service, has joined R. S. Aries and Associates, chemical engineers and economists as vice president, according to an announcement by Dr. Robert S. Aries, president. Gen. Waitt is an M.I.T. graduate. Prior to his military career, he was an instructor at the University of Kentucky and later a special assistant to Dr. W. T. Sedgwick, head of the Dept. of Biology and Public Health at M.I.T. He was also associated with the Avery Chemical Company and the E. M. Hamlin Co., Boston, before he accepted a Regular Army commission in 1920.

General Waitt was a member of the Committee on Chemistry and Chemical Technology, National Research Council, from 1945 to 1949, and served as U. S. delegate to the International Congress of Pure and Applied Chemistry, London, in 1947, and to the International Congress of Industrial Chemistry at Brussels in 1948.



Maj. Gen. A. H. Waitt

Edward H. Staab

EDWARD H. STAAB has been appointed to the Nova Chemical Corporation's sales organization. Mr. Staab has been connected with Paulden Laboratories and previously with the National Aniline Division, Allied Chemical & Dye Corporation. In addition to his sales duties he will render technical service in the New Jersey-New York area. An AATCC member for many years, Mr. Staab is a Pratt Institute graduate.

DR. DONALD J. MONTGOMERY has been appointed as a Senior Physicist in the Textile Research Institute, according to an announcement by Dr. John H. Dillon, Director of Research. Dr. Montgomery will be directly associated with the Wool Research Project under the direction of Dr. James H. Wakelin. A native of Cincinnati, Ohio, Dr. Montgomery received his doctorate at the University of Cincinnati. Following positions on the faculties of the University of Cincinnati and Princeton University, he was attached to the U. S. Embassy in London. Upon his return he accepted a position with the Ballistics Research Laboratories at the Aberdeen (Md.) Proving Grounds. At present Dr. Montgomery is reported to be developing an electronic integrating circuit which will, when used in connection with the Instron Tensile Tester, give an automatic and continuous recording of the energy absorbed by a fiber or yarn under increasing stress. Measurements of this type are being used in the Wool Research Project to distinguish different grades of wool at various intervals during processing.

ROBERT N. PENNIE has been added to the research staff of the Amalgamated Chemical Corporation Research Laboratory, Philadelphia, Pa. A Temple University graduate, Mr. Pennie, was previously employed by the Philadelphia Electric Company. His work will be related to new chemicals in the textile, leather and paper industries.

CHESTER R. AUSTIN of Bellefontaine, Ohio has been appointed manager of the development section of the Research Department of Koppers Company, Inc., according to an announcement by Dr. G. F. D'Alelio, vice president and manager. An Ohio State University graduate, Mr. Austin joined Koppers as a ceramic engineering specialist in 1948 following employment with the Engineering Experiment Station of OSU from 1929-1933 and the Batelle Memorial Institute, Columbus, O. in ceramic research.

TECHNICAL LITERATURE

Popular Economics—a new publication issued by The Institute of Economic Affairs, New York University, 32 Broadway, New York 4, N. Y. It will be published monthly except July and August and the subscription rate is $1.50 per year. The publication is designed to make understandable, for the general reader, the economic system by which life is sustained and living improved. It is written in popular style, without heavy volumes of charts and data, and the material is clear, accurate and compact. Contents of the first issue are described by the following titles: Design for Prosperity—From Trolleys to Toasters and Television, Pioneers Have Changed the Life of Our Times; Cartoon Parade—Presenting the Best of Recent Editorial Art; The Story of Magnesium—Metal from the Sea; Myths for Moderns—The Frontier Has Gone; Meet King Joe—Cartoon Story of an American Factory Worker; Americans of Vision—Theodore Newton Vail; Keyboard for the World's News—The Linotype; Hide nad Seek with Taxes; Fruits of Research—Ideas from the Laboratories that Help Satisfy Your Needs; The Reading Chair—Brief Reviews of New Books. Editorial Director of the new publication is Clayton Hoagland, at one time Managing Editor of AMERICAN DYESTUFF REPORTER and for twenty years an editorial writer on the *New York Sun*.

Omega Universal Feeders — 12-pages (Bulletin No. 20-G14), issued by Omega Machine Co., Providence, R. I. Devoted to three sizes covering a chemical feeding range from 1 to 5000 lb. per hour. The feeders are said to handle practically all types of dry chemicals or materials used in the treatment of water. Included are a discussion of features (such as high accuracy, wide range, dust-proofness, etc.), diagrams showing automatic proportional control and typical arrangements and installations, photographs of the equipment, and special applications and data on computing dissolving chamber capacities. Typical specifications, feeder quotation request sheet, and diagrams and tables of dimensions complete the bulletin.

Booklet on Stymer S—Merrimac Division of Monsanto Chemical Co., Everett, Mass. Application of Stymer S, a synthetic size for synthetic warps, graphically described. The booklet contains charts, photos and line drawings, and covers the products' advantages in mixing, sizing, weaving and de-sizing. Preparation of size, slashing acetate and viscose, and weaving Stymer S sized warps are also discussed. Among the illustrations is a table of typical examples of Stymer S in use. Also included are tests to distinguish Stymer S and protein type warp sizing agents on yarn or greige goods.

Corrosion Proof Cements (Bull. No. 5-1) —a description of Atlas Mineral Products Company's complete line of resin, sulfur, silicate and asphaltic cements. Information on each is in chart form. Included is information on the company's new Alkor 5E, "the nearest thing to a universal corrosion-resistant cement. Write to 43 Walnut St., Mertztown, Pa.

OBITUARY

ERIC F. HEMPEL

ERIC F. HEMPEL, President of the Milwaukee Dyeing and Bleaching Company, Milwaukee, Wisconsin, died on June 29th at the age of 68.

Mr. Hempel was one of the charter members of the Mid-West Section of the AATCC and was chairman of the section in 1933. Up until the time of his death he always took an active part in the affairs of the section and his loss will be felt by all members.

Eric F. Hempel

SANDOZ PRESENTS *The color achievement of the month*

Muted Tones ...BY ALEXANDER SMITH

If we were to continue the *musical* figure of speech used by Alexander Smith in advertising its Set-twist broadloom carpeting...

seven shades of *muted* lustre,
from *hushed* pastels to *resonant*
deep tones

we might be tempted to add...*and the melody lingers on.*

For the color beauty of fabrics dyed with Sandoz colors—which are among the supplies used by Alexander Smith—is virtually imperishable.

To preserve the character of the shade in the face of light, cleaning and wear, carpeting manufacturers use such Sandoz colors as

ALIZARINE L VIOLET RCN
BRILLIANT ALIZARINE L BLUE 3F
XYLENE FAST RUBINE 3GP
XYLENE L YELLOW 2G AND 3G

In the mill, too, these Sandoz colors are a delight to use—they are exceptionally level-dyeing even in the lightest shades, and they retain their full brightness throughout processing.

For any chrome, acid or direct dyes ...or auxiliary chemicals...and for both natural and synthetic fibres... be guided by the successful "color achievements" you see in these Sandoz advertisements.

COTTON AND RAYON DYERS! NOW—DIRECT DYE WITH COMPLETE CONFIDENCE IN COLOR FASTNESS

New CUPROFIX colors and after-treatment give fastness to washing, light, etc., that formerly required more expensive vat dyeing. Write for booklet on CUPROFIX, already adopted by dozens of mills.

SANDOZ CHEMICAL WORKS, INC., 61 VAN DAM STREET, NEW YORK 13, N. Y.

Application laboratories and stocks at Boston, Philadelphia, Charlotte, Chicago, Los Angeles, Toronto • Other branches at Providence, Paterson and Montreal

SANDOZ *thinks ahead with textiles*

SANDOZ

LAUREL SYNTHETIC DETERGENTS

speed your
textile processing . . . cut costs
-superior penetrants, scours, softeners

Laurel Diotrene T – excellent penetrant and softener. Recommended as a wetting agent . . . may be used in finishing bath as softener.

Superterge L – efficient penetrant and dispersant. Stable in lime or acids. Satisfactory in hard water. May be used for scouring cotton goods and as aid in level dyeing all types of colors. Has outstanding absorbent and rewetting qualities.

Supergel RS – good scour used alone or in combination with alkalies. Fine dispersant, fast penetrant as well. Recommended for scouring cotton and synthetic fibers.

The speedy action of Laurel's new synthetic penetrants and detergents has won the approval of leading textile processors . . . their unusual penetrating and scouring qualities produce efficient results even in hard water.

Textile Soaps, Oils, Finishes
LAUREL SOAP MANUFACTURING CO., Inc.
Wm. H. Bertolet's Sons
ESTABLISHED 1909

Send today for trial order of these versatile Laurel Synthetic Detergents.

Laurel Hydrosol • Laurel Hosiery Finishes — *Laurel Textile Oils*

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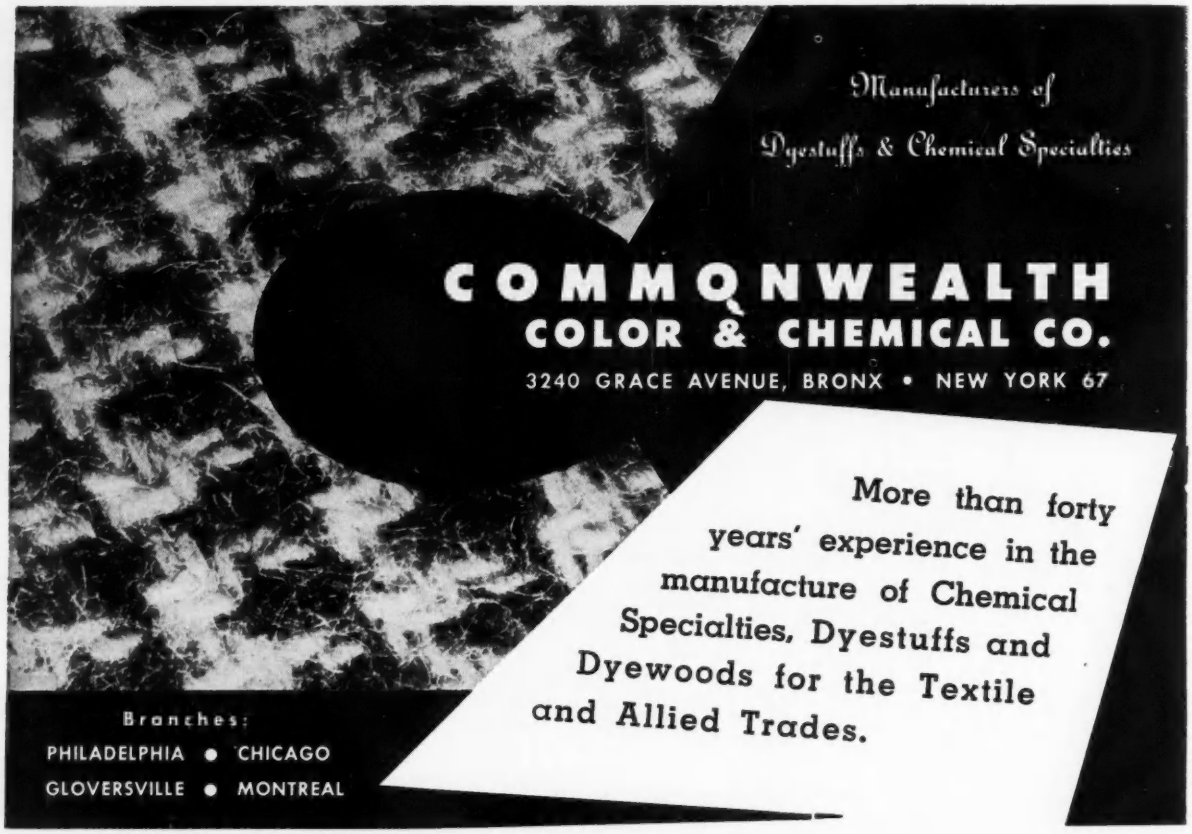

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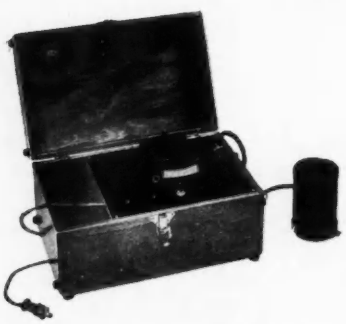

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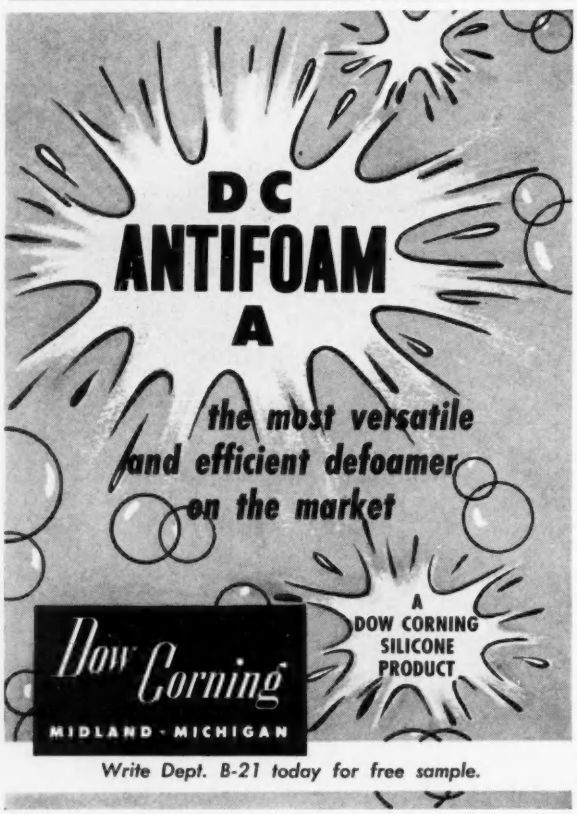

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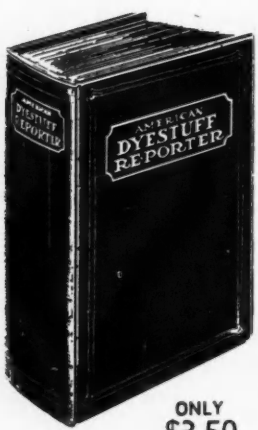

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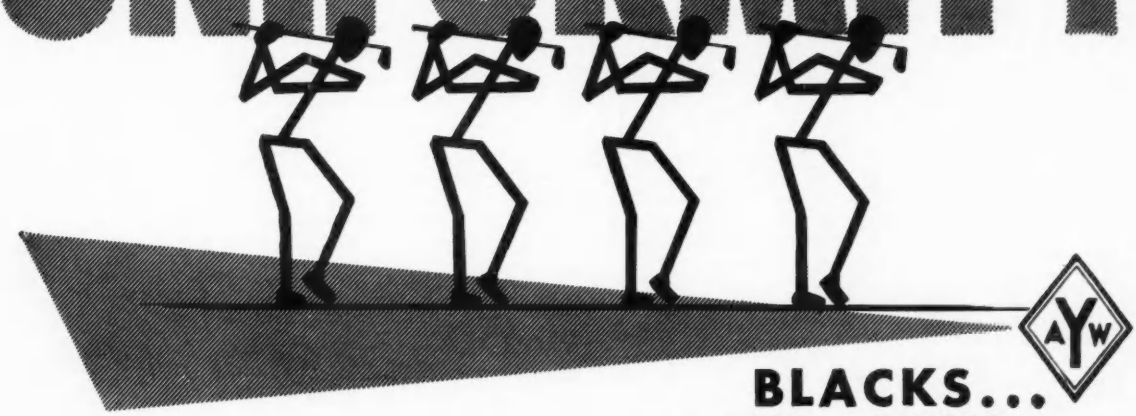

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The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery wanted or for sale—the rate is $7.50 per column inch or less per insertion.

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WANTED: By a large manufacturer of dyestuffs and chemicals, salesman for Penna. and New Jersey. Man about 35 years of age preferred. Write Box No. 936.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 OF AMERICAN DYESTUFF REPORTER published bi-weekly at New York, N. Y., for October 1, 1950.

State of New York, County of New York, ss.:

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Norman A. Johnson, who, having been duly sworn according to law, deposes and says that he is the Editor of the AMERICAN DYESTUFF REPORTER, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily, weekly, semi-weekly or tri-weekly newspaper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946, (section 537, Postal Laws and Regulations) printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher — Howes Publishing Co., Inc., 44 E. 23rd St., New York 10, N. Y.; Editor — Norman A. Johnson, 44 E. 23rd St., New York 10, N. Y.; Managing Editor — Charles A. Whitehead, 44 E. 23rd St., New York 10, N. Y.; Business Manager — None.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

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3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

NORMAN A. JOHNSON, Editor.

Sworn to and subscribed before me this 29th day of September, 1950.
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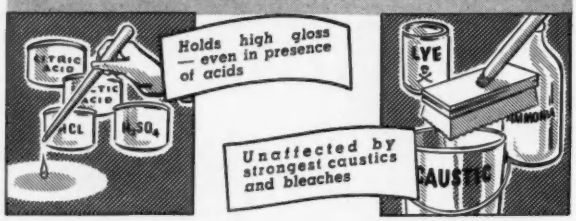

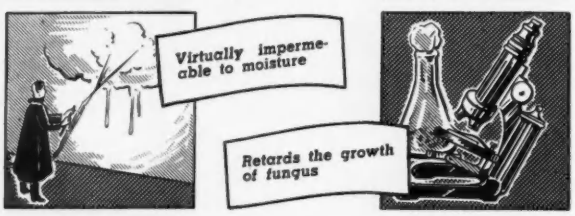

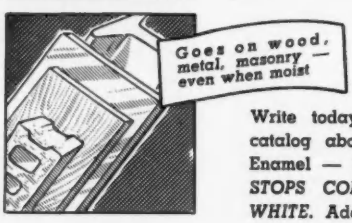

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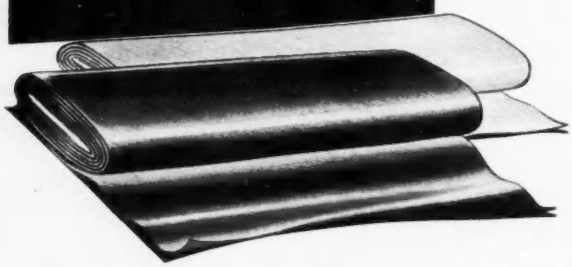

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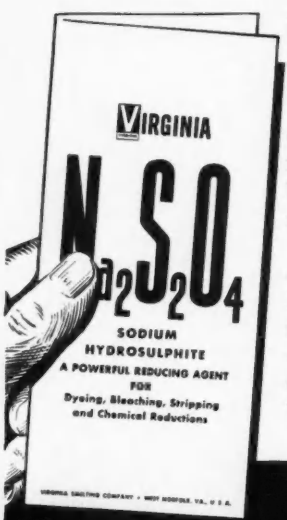

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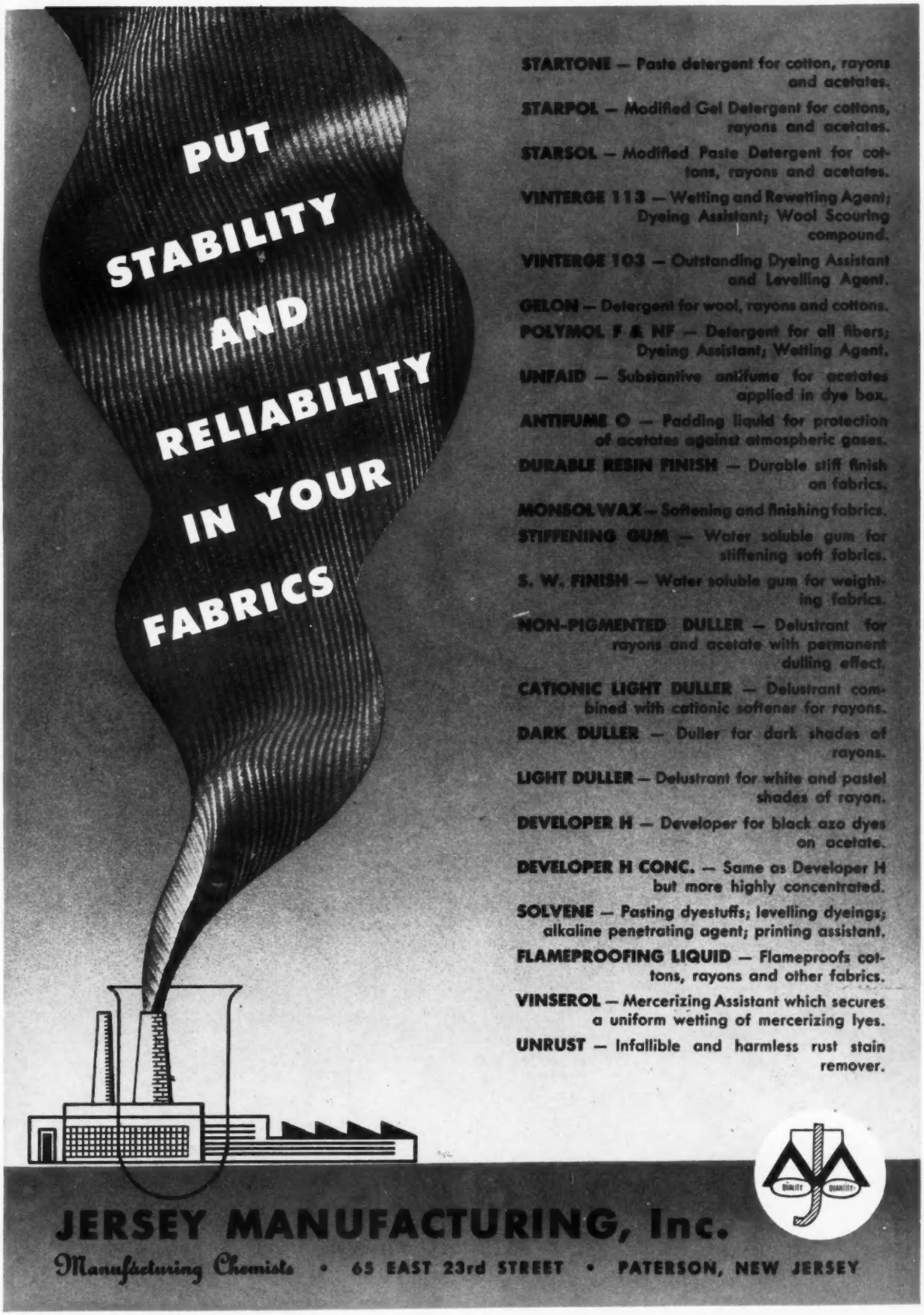

STARTONE — Paste detergent for cotton, rayons and acetates.

STARPOL — Modified Gel Detergent for cottons, rayons and acetates.

STARSOL — Modified Paste Detergent for cottons, rayons and acetates.

VINTERGE 113 — Wetting and Rewetting Agent; Dyeing Assistant; Wool Scouring compound.

VINTERGE 103 — Outstanding Dyeing Assistant and Levelling Agent.

GELON — Detergent for wool, rayons and cottons.

POLYMOL F & NF — Detergent for all fibers; Dyeing Assistant; Wetting Agent.

UNFAID — Substantive antifume for acetates applied in dye box.

ANTIFUME O — Padding liquid for protection of acetates against atmospheric gases.

DURABLE RESIN FINISH — Durable stiff finish on fabrics.

MONSOL WAX — Softening and finishing fabrics.

STIFFENING GUM — Water soluble gum for stiffening soft fabrics.

S. W. FINISH — Water soluble gum for weighting fabrics.

NON-PIGMENTED DULLER — Delustrant for rayons and acetate with permanent dulling effect.

CATIONIC LIGHT DULLER — Delustrant combined with cationic softener for rayons.

DARK DULLER — Duller for dark shades of rayons.

LIGHT DULLER — Delustrant for white and pastel shades of rayon.

DEVELOPER H — Developer for black azo dyes on acetate.

DEVELOPER H CONC. — Same as Developer H but more highly concentrated.

SOLVENE — Pasting dyestuffs; levelling dyeings; alkaline penetrating agent; printing assistant.

FLAMEPROOFING LIQUID — Flameproofs cottons, rayons and other fabrics.

VINSEROL — Mercerizing Assistant which secures a uniform wetting of mercerizing lyes.

UNRUST — Infallible and harmless rust stain remover.

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